OPERATING INSTRUCTIONS

CEQ™ 28

COMPUTER CONTROLLED

GRAPHIC EQUALIZER

PEAVEY®

ARCHITECTURAL
ACOUSTICS™

CEQ™-28 OWNER'S MANUAL

CONTENTS:

INTRODUCTION AND GENERAL DESCRIPTION OF
## THE PEAVEY ARCHITECTURAL ACOUSTICS CEQ™ 28

Introduction

Thank you for purchasing the Peavey Architectural Acoustics CEQ™ 28. In working with this manual we recommend that you have the unit in front of you in order to follow through the examples with the text.

The CEQ 28 is a user-friendly, microprocessor-driven, EQ system package. It has the ability to EQ a room to a flat response or any other response-curve that is required; then, other pre-made or user-tailored curves may be added. There are 128 user-selectable memories and a built-in, system-exclusive dump facility. The CEQ 28 also contains seven (two user-definable and five preset) external microphone compensation settings.

The CEQ 28 delivers:

- 28-band EQ on 3rd octave centers
- 26-bands feature constant-Q filters
- Top and bottom bands (32 Hz and 16 kHz) feature shelving filters
- Built-in pink noise generator
- Real time analysis/EQ capability
- User-friendliness
- A 40 × 2 character 'easy read' liquid crystal display
- MIDI controllable sliders, +/- 12 dB in 1 dB steps, or +/-6 dB in 0.5 dB steps
- The adding of responses to other stored responses
- 7 mic 'correction' programs
- 128 complete EQ program memories
- Compact 1 I.U. rack-mounting configuration

Front Panel
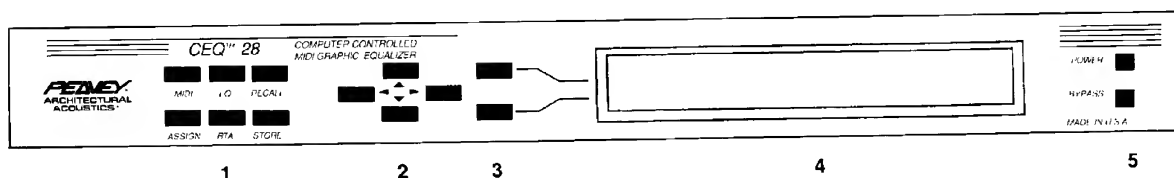
Front Panel Sections

The CEQ 28 operates on a page-type display system, designed for ease of use of its many advanced functions. These pages will be referred to as displays throughout this manual. Within a particular display, functions can be selected and edited using the softkeys beside the display, the 4-way cursor keys, and the six function select keys to the left of the unit.

The front panel of the unit can be broken down into five functional areas as shown below.

1. Selector Keys - The keys in this section are used to choose various major program functions.

2. Cursor Keys - These keys are used to navigate within a given display and to set up parameter functions that appear in the display window.

3. SoftKeys - These keys interact with information present in the display window, performing various selection and menu movement commands.

4. Display Window - Large easy-to-read, 40 × 2 character, illuminated liquid-crystal, programming environment.

5. On/Off & Bypass Switches - Two switches, one for powering up the unit, and one for bypassing the EQ.

Before going further in this manual, it is recommended that the reader powers up the CEQ 28, as step-by-step examples of the basic operation of the CEQ 28 are given throughout this text.

USING THE CEQ™ 28 INTERFACE

1. Setting up

First, we need something to play through the CEQ 28. Connect a music source to the line input and the output to a suitable mixer, amplifier and speakers. When the CEQ 28 is turned on, you will see a title page which looks like this:

```
Peavey Electronics Corporation
CEQ 28 Ver 1.10    Battery OK
```

The message in the lower right-hand corner concerns the condition of your memory back-up battery. If this message reads 'Battery Low', try leaving your unit connected and switched on for an hour or so. If the message has not changed to Battery OK, take your unit to

the nearest Peavey Authorized Service Center for battery replacement. This battery should last for years, as it is charged up automatically when you are using the unit, but as it plays an important part in keeping the unit's memory 'live', you should always observe its condition. After a short time the screen will change to the EQ window. It will look like this (the flashing cursor in your display may be positioned next to another frequency band. If this is the case, then the cursor frequency display in the lower righthand corner will be different from the display shown here. Moving the cursor will be explained in the Cursor Manipulation section of the text):

```
OPT                                      0dB
DSPL  ==========================  160Hz
                    -
```

NOTE: Ensure that the BYPASS switch is in the 'out' position (right-hand end of the unit's front panel below the power switch). If the BYPASS switch is engaged (pushed in), the legend 'EQUALIZER BYPASSED' will be displayed.

2. Bypass Section

BYPASS mode (EQUALIZER BYPASSED displayed) is activated by pushing in the BYPASS switch. This causes the unit to be bypassed, so that no EQ* is applied by the CEQ 28 while the unit is in this condition. Parameters can be changed while the equalizer is bypassed. Pressing any of the cursor keys will return the display to the page that was being displayed before the unit was bypassed without making any changes to that page. If no keys are pressed, for a period of approx. 20 seconds, the equalizer bypass display will return.

*NOTE: If the subsonic filter is currently active before entering the Bypass mode, it will remain active (will not be bypassed) when the bypass mode is used.

3. Cursor Manipulation

At the bottom of the EQ window is a small flashing cursor. In this particular window, the cursor keys enable you to select the EQ band that you require, and raise/lower a frequency band's response. By manipulating the four cursor keys, you will be able to move this cursor around.
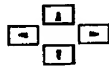
Push the right-hand cursor key once only. This will cause the cursor to move to the right, and the display will reflect this change:

```
OPT  =                              0dB
DSPL   =====================   200Hz
                _
```
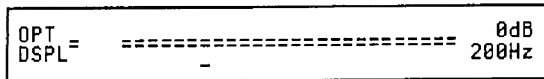
4. Frequency Filter Changes

The cursor has moved across just one frequency band. Every line like this '-' in the array of broken lines represents a particular frequency band. We have caused the flashing cursor to move across from the 160 Hz band to the 200 Hz band, by pushing the right hand key > once. Push the left hand cursor key < once.

```
OPT  =                              0dB
DSPL   =======================  160Hz
                _
```
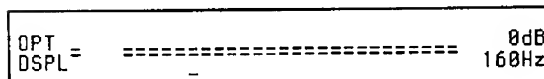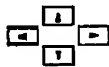
The cursor moves one position to the left, and we are back with the display in the EQ display, where we started (in this case 160 Hz).

If you hold your finger on the left- < or right-hand cursor key, the cursor will auto-scroll in either direction. Pushing the cursor key once will move the flashing cursor over one position at a time.

Move the flashing cursor back to the 160 Hz band, now push the 'up' ∧ cursor key once.

```
OPT  =                            +1dB
DSPL   =====-=================   160Hz
                _
```
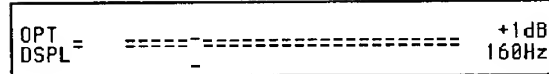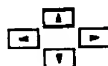
The window shows a further change. This segment of the double line has become one single line, and has moved up one segment. The '0 dB' sign has also changed to read '+1 dB'. By pressing the 'up' ∧ cursor key once, you have increased the gain of the 160 Hz band by 1 dB. Push the down cursor twice.
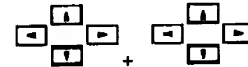
As you can see, the 160 Hz band is now set for 1 dB EQ cut and the legend '-1 dB' is now shown in the upper right-hand corner of the display. You have now decreased the 160 Hz band's gain by 1 dB. If you press the up ∧ cursor key once more,

```
OPT  =                              0dB
DSPL   ==========================  160Hz
                _
```
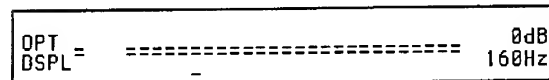
you will see the double lines re-appear in the display window, and the 'dB gain' readout has returned to showing 0 dB, indicating that the 160 Hz band of your EQ is now back in the flat EQ position. As you can see, the double lines method of display setup gives a rapid visual indication of which parts of the CEQ 28's EQ curve are set to a flat characteristic.

5. Overall Level

Push and hold the left-hand < cursor key until the flashing cursor line is in the far left position:

```
OPT  =                              0dB
DSPL   =========================  LEVEL
```
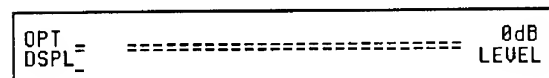
Now push the cursor up ∧ key once. The double line here has become a single line again, and the 0 dB legend in the top right-hand corner now shows '+1 dB'. You have just moved the overall gain of the whole EQ up by 1 dB:

```
OPT  -                            +1dB
DSPL   =========================  LEVEL
```
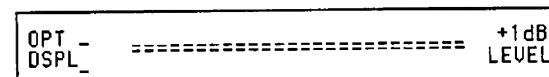
Now use the cursor keys to return the overall level to 0 dB.

Using the right hand cursor key (> > >), move the flashing line cursor to make the display show the 160 Hz band:

```
┌──────────────────────────────────────┐
│ OPT ═ ========================== 0dB │
│ DSPL═                            160Hz│
│              _                        │
└──────────────────────────────────────┘
```
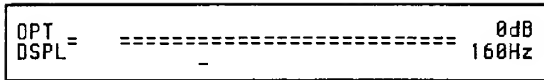
NOTE: The EQ gain is usually adjusted so that when you switch between BYPASS and EQ active (BYPASS switch in the Out position), the apparent audio level does not change.

6. Softkey Manipulation

The Softkeys of the CEQ 28 perform different functions, depending in which particular mode you have placed the unit. The labels in the left-hand side of the display window define the functions of the two Softkeys in a particular mode of operation. Look at the two Softkeys and follow the line that links each of them to the respective labels. In this particular display the uppermost of the two Softkeys is labelled OPT (OPTion) and the lower Softkey is labelled DSPL (DiSPLay). These Softkey labels will change according to which display you are operating in.

```
 ┌─┐  ┌──────────────────────────────────────┐
 │▤├──┤ OPT ═ ========================== 0dB │
 │ │  │ DSPL═                            160Hz│
 │▢├──┤              _                        │
 └─┘  └──────────────────────────────────────┘
```

Press the lower Softkey once.

```
 ┌─┐  ┌──────────────────────────────────────┐
 │▢├──┤ OPT ═ ========================== 0dB │
 │ │  │ DSPL═                            160Hz│
 │▨├──┤              _                        │
 └─┘  └──────────────────────────────────────┘
```

and look at the display:

```
 ┌─┐  ┌──────────────────────────────────────┐
 │▢├──┤ OPT              ☰☰               0dB │
 │ │  │ DSPL   _         ☰☰             _ 160Hz│
 │▢├──┤                                        │
 └─┘  └──────────────────────────────────────┘
```
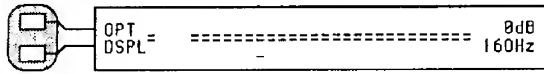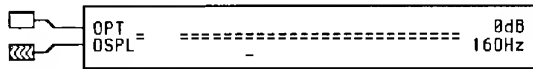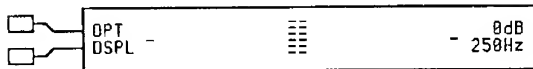
The display has changed. There is one flashing cursor at each end, and a stack of six small lines in the display's middle. This is the same EQ display that we have worked with before, but it has been turned on its end and now represents a vertical, instead of horizontal, display. Each pair of lines in the stack represents one of the EQ bands in just the same way as the previous displays. The only difference is that they are now displayed as a vertical stack. Some people will find this display more convenient with which to work.
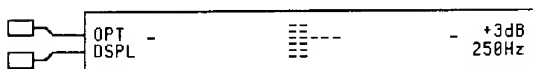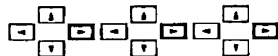
Press the lower cursor key twice:

```
        ┌─┐
     ┌─┐│▲│┌─┐┌─┐┌─┐
     │◄││ ││►││◄││►│
     └─┘│▼│└─┘└─┘└─┘
        └─┘
```

The display window has changed to represent a different frequency band:

```
 ┌─┐  ┌──────────────────────────────────────┐
 │▢├──┤ OPT              ☰☰               0dB │
 │ │  │ DSPL   _         ☰☰             _ 250Hz│
 │▢├──┤                                        │
 └─┘  └──────────────────────────────────────┘
```

Push the right-hand cursor key three times:

```
     ┌─┐      ┌─┐      ┌─┐
  ┌─┐│▲│┌─┐┌─┐│▲│┌─┐┌─┐│▲│┌─┐
  │◄││ ││►││◄││ ││►││◄││ ││►│
  └─┘│▼│└─┘  │▼│      │▼│└─┘
     └─┘      └─┘      └─┘
```

```
 ┌─┐  ┌──────────────────────────────────────┐
 │▢├──┤ OPT    _          ☰☰---           _ +3dB│
 │ │  │ DSPL              ☰☰               250Hz│
 │▢├──┤                                          │
 └─┘  └──────────────────────────────────────┘
```
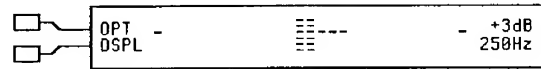
The frequency band gain has now been changed by +3 dB. Pushing the left-hand cursor key < decreases

this gain every time you push it. You are using the *same cursor interface*, in exactly the *same way* as in the *previous examples*.
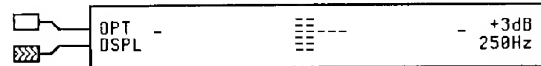
If you press the up Λ cursor key and continue holding it down, you will arrive at the overall level facility.

Pressing the left- < and > right-hand cursor keys will change the overall level in the same way that the up Λ / V down keys did in the previous example (horizontal display).
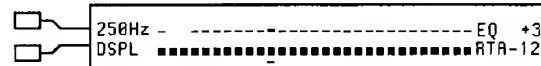
Using the cursor keys, make the display look like this again:

```
 ┌─┐  ┌──────────────────────────────────────┐
 │▢├──┤ OPT   _           ☰☰---          _ +3dB│
 │ │  │ DSPL              ☰☰               250Hz│
 │▢├──┤                                          │
 └─┘  └──────────────────────────────────────┘
```

Push the DSP: Softkey once again:

```
 ┌─┐  ┌──────────────────────────────────────┐
 │▢├──┤ OPT   _           ☰☰---          _ +3dB│
 │ │  │ DSPL              ☰☰               250Hz│
 │▨├──┤                                          │
 └─┘  └──────────────────────────────────────┘
```

You will now see another display. This is the RTA display.

```
 ┌─┐  ┌──────────────────────────────────────┐
 │▢├──┤ 250Hz _ ------------------------EQ  +3│
 │ │  │ DSPL ■■■■■■■■■■■■■■■■■■■■■■■■■■■■RTA-12│
 │▢├──┤                                        │
 └─┘  └──────────────────────────────────────┘
```
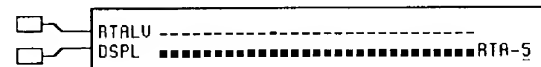
7. The EQ/RTA Display

(NOTE: When you are in the horizontal EQ display, pushing the lower (DSPL) Softkey twice will bring up the RTA display.)

Here we see one line of EQ in the top row of dashes and the RTA (Real-Time Analyzer) display as a line of blocks at the bottom of the window. The Equalizer is adjusted in the same way as in the horizontal display (see previous). The cursor left- < and > right-hand keys select the frequency band, and the up Λ or V down cursor keys adjust the cut and boost. When a music source is playing through the CEQ 28, you will see the RTA blocks moving up and down, giving you a visual real-time analysis of the frequency response. Each of the RTA blocks displays the relative level of the signal in that particular frequency band.

```
 ┌─┐  ┌──────────────────────────────────────┐
 │▢├──┤ 250Hz _ ------------------------EQ  +3│
 │ │  │ DSPL ■■■■■■■■■■■■■■■■■■■■■■■■■■■■RTA-12│
 │▢├──┤              _                         │
 └─┘  └──────────────────────────────────────┘
```
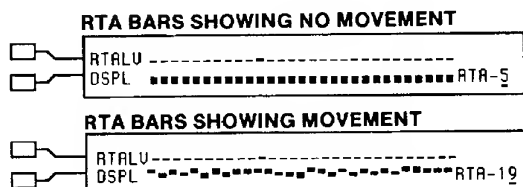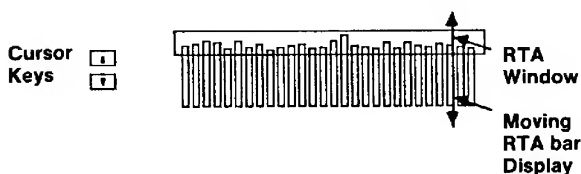
8. Adjusting the RTA display level

Using the cursor right key > , move the cursor all the way to the right hand side of the display window. The resulting display looks like this:

```
 ┌─┐  ┌──────────────────────────────────────┐
 │▢├──┤ RTALV ------------------------------- │
 │ │  │ DSPL ■■■■■■■■■■■■■■■■■■■■■■■■■■■■RTA-5 │
 │▢├──┤                                        │
 └─┘  └──────────────────────────────────────┘
```

The number in the lower right hand corner of the display is the RTA gain figure. You can adjust this by using the cursor up Λ or V down keys. You will see this number change in response to your key manipulations. Because the RTA number is subtracted from a high value of 0 dB, every entry will yield a negative, or minus, number.

As you move the RTA level up and down, there will be times when you can no longer see a response in the RTA display. This is because the dynamic level has moved beyond the scope of the display. In order to find the dynamically moving portion, press the cursor up Λ or

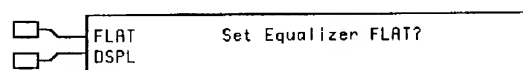**V** down keys. This has the effect of sliding the RTA bar display up and down within the display window:

```
Cursor  [←]    ▐█▌▄▐█▌▄▐█▌▄▄▐█▌▄▄▐█▌▄▐█▌    RTA
Keys    [→]    ▐█▌▐█▌▐█▌▐█▌▐█▌▐█▌▐█▌▐█▌     Window

                                            Moving
                                            RTA bar
                                            Display
```

RTA BARS SHOWING NO MOVEMENT

```
□─┐  RTALU --------------------------
□─┘  DSPL ••••••••••••••••••••••••••••RTA-5
```

RTA BARS SHOWING MOVEMENT

```
□─┐  RTALU--------------------------
□─┘  DSPL ▪-▪-▪▪▪▪▪▪▪▪-▪▪▪▪-▪-▪-▪-▪▪▪▪RTA-19
```

9. The EQ Flat Facility
Push the DSPL Softkey once:

```
□──┐  RTALU--------------------------
▨─┘   DSPL ▪-▪-▪▪▪▪▪▪▪▪-▪▪▪▪-▪-▪-▪-▪▪▪▪RTA-19
```
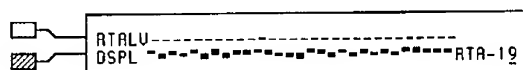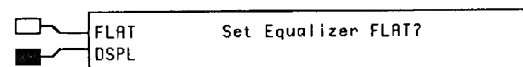
You will now see another display. This is the EQ FLAT display. This facility is designed to help you when you have a curve built up in the CEQ 28 and you wish to start with a fresh flat curve from which to build your new EQ curve from.

```
□─┐  FLAT      Set Equalizer FLAT?
□─┘  DSPL
```

Press the DSPL Softkey:

```
□─┐  FLAT      Set Equalizer FLAT?
■─┘  DSPL
```

You have now rolled forward to the last EQ display that you saw, but in the horizontal display mode:

```
□─┐  OPT _                            +3dB
□─┘  DSPL= =======‾==================  250Hz
                _
```
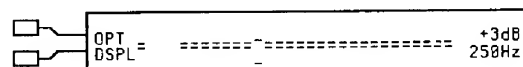
By now, you should be familiar with the way that the CEQ 28 DiSPLay works. If you are in any doubt about this, why not try moving through the above exercises again. All these key manipulations will soon become second nature to you.
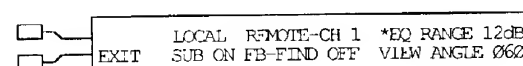
THE ASSIGN SELECTOR KEY

1. EQ Assign
Push the 'Assign' function selector key:

```
        □
      ASSIGN
```

The display looks like this:

```
□─┐         LOCAL  REMOTE-CH 1  *EQ RANGE 12dB
□─┘  EXIT   SUB ON FB-FIND OFF   VIEW ANGLE Ø60
```

2. EQ scale selection
Press the left- **<** or **>** right-hand cursor keys until the pulsing star is positioned to the left of the EQ range legend.

Pressing the cursor up **∧** or **V** down keys changes the number displayed between 6 dB and 12 dB. This selects the EQ range. In the 12 dB setting the EQ will work in 1 dB steps. In the 6 dB setting the EQ will work in 0.5 dB steps. When an EQ curve is STOREd, the EQ range in which the EQ was created is also STOREd. The Subsonic Filter On/Off is also STOREd with an EQ curve.

3. Subsonic filter on/off selection
Push the left- **<** or **>** right-hand cursor keys until the pulsing star indicator is to the left of the 'Subsonic' legend:

```
□─┐          LOCAL  REMOTE-CH 1   EQ RANGE 12dB
□─┘  EXIT   *SUB ON FB-FIND OFF   VIEW ANGLE Ø60
```
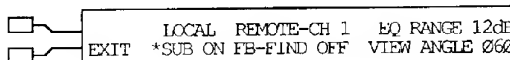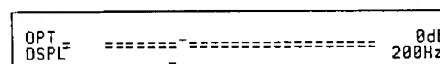
Pressing the cursor up **<** or **>** down keys changes the letters displayed between ON and OFF. ON places a subsonic filter at 40 Hz in line with the EQ. OFF disables this filter.

In sound reinforcement applications, low frequency loudspeaker enclosures do not have usable response below 40 Hz, and most small systems cut off at 60 Hz. Attempting to reproduce frequencies below the loudspeaker's cutoff point only results in distortion, loss of headroom and risk of damage to the loudspeaker system. Except for home Hi-Fi or similar applications where reproduction of these low frequencies is desired, it is recommended that you leave the Subsonic Filter on.

```
□─┐          LOCAL  REMOTE-CH 1   EQ RANGE 12dB
□─┘  EXIT   *SUB ON FB-FIND OFF   VIEW ANGLE Ø60
```
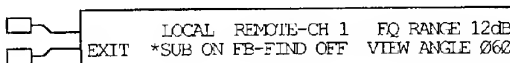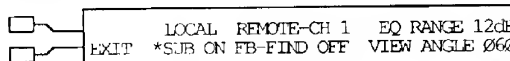
NOTE: In the default setting, the subsonic filter is active, the 32 Hz and 40 Hz bands are filtered out and are, therefore not available for EQ purposes. If the lowest two frequency bands appear to be missing when you look at the EQ display, the Subsonic filter is active:
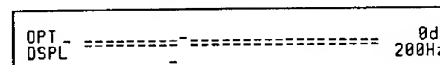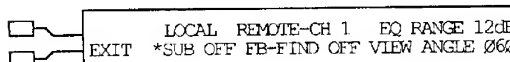
EQ DISPLAY WITH SUBSONIC FILTER ACTIVATED

```
□─┐  OPT _                             0dB
□─┘  DSPL‾ =======‾================= 200Hz
                 _
```

DISPLAY

```
□─┐          LOCAL  REMOTE-CH 1   EQ RANGE 12dB
□─┘  EXIT   *SUB ON FB-FIND OFF   VIEW ANGLE Ø60
```

EQ DISPLAY WITH SUBSONIC FILTER DE-ACTIVATED

```
□─┐  OPT _                             0dB
□─┘  DSPL =========‾================= 200Hz
                  _
```

DISPLAY

```
□─┐          LOCAL  REMOTE-CH 1   EQ RANGE 12dB
□─┘  EXIT   *SUB OFF FB-FIND OFF  VIEW ANGLE Ø60
```
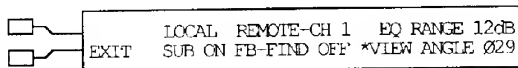
NOTE: for the purpose of future examples, we have switched the subsonic filter OFF. The displays will reflect this by having the two subsonic bands showing in all displays where they would normally occur.

4. Viewing Angle selection

When viewing the display window, it will be found that certain up/down angles may make the display somewhat difficult to read. You can adjust the viewing angle of your display by using the cursor up Λ or V down keys. Move the pulsing star indicator next to the VIEW ANGLE option by using the left- < or > right-hand cursor keys and then adjust the viewing angle for maximum visual clarity by using the Λ or V keys:

```
┌──┐──┐       LOCAL  REMOTE-CH 1    EQ RANGE  12dB
┌──┐──┘ EXIT   SUB ON FB-FIND OFF *VIEW ANGLE Ø29
```
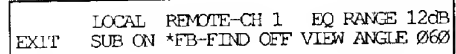
5. Feedback Find

When the feedback-find feature is turned on, and you are in one of the three EQ display pages, the cursor will automatically move to the frequency band that has the loudest signal. Now you can lower the level of that band and reduce the problem of feedback at that frequency. This feature is best used after careful equalization as described in sections VI and VII of this manual.

Using Feedback Find After System Equalization

By turning the sound system gain up until feedback occurs, the cursor will then jump to the corresponding equalizer band. By pressing the down V key, you will be cutting the band that is feeding back. This process is most easily observed while in the EQ/RTA display so that you can also see the strength of the signal in each band on the RTA. (It is also more fun to watch in this display.) You must use some care in using this technique for equalizing your system. If severe cuts are made to reduce feedback, the sound that the audience hears may be adversely affected. In other words, after carefully equalizing your system (preferably with the mics turned on), you should try to cut the bands where feedback occurs as little as possible. If you make many changes to the EQ settings, you should carefully listen to the system to be sure that it still sounds good.

Press the left < OR > right cursor keys until the cursor is positioned to the left of FB-FIND label.

```
┌─────────────────────────────────────────────┐
│       LOCAL  REMOTE-CH 1    EQ RANGE  12dB    │
│ EXIT   SUB ON *FB-FIND OFF  VIEW ANGLE Ø6Ø    │
└─────────────────────────────────────────────┘
```

Pressing either the Up Λ or V Down keys will toggle the feedback-find function on or off. While the feedback-find function is on and you press one of the cursor keys to make an equalization adjustment, the cursor will stay in that position for about 3 seconds before restarting its search for the band with the highest level. The signal must also be above a minimum threshold before the feedback-find starts to work. This means that once the cursor has moved the band that was feeding back, it will stay there if you turn the system gain down.

This feature can also be used during live performance. But if the feedback howl is not very loud compared to the music, the cursor will jump to the loudest band, which may be music. So use with care.

6. Remote Control of the CEQ 28R Equalizer

The CEQ 28R is a graphic equalizer that has most of the features of the CEQ 28 but with limited front panel controls and display. The display and buttons of the CEQ 28 are used to remotely control the CEQ 28R via MIDI. Up to 15 CEQ 28Rs can be controlled by setting each to a different MIDI channel and to a channel different from the CEQ 28.
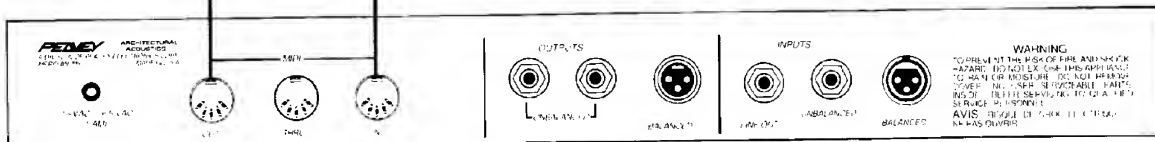
Connecting the CEQ 28:

Connect the MIDI output of the CEQ 28 in the MIDI input of the CEQ 28R. Also connect the MIDI output of the CEQ 28R to the MIDI input of the CEQ 28.
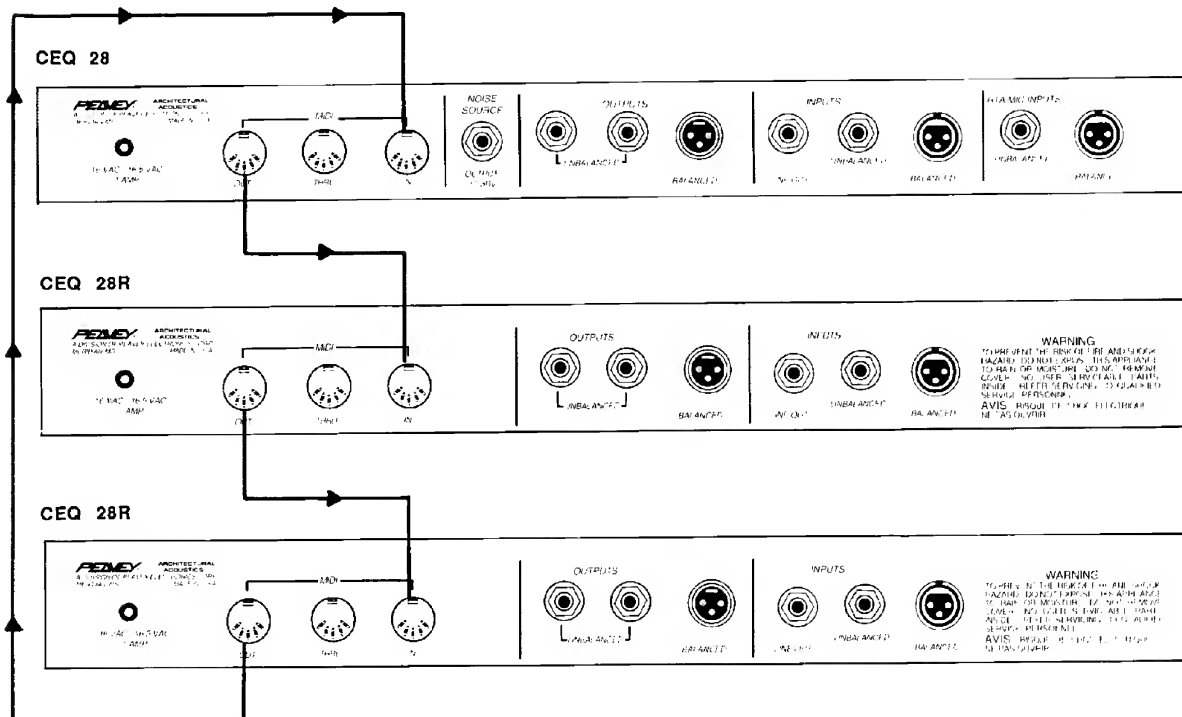
CEQ 28
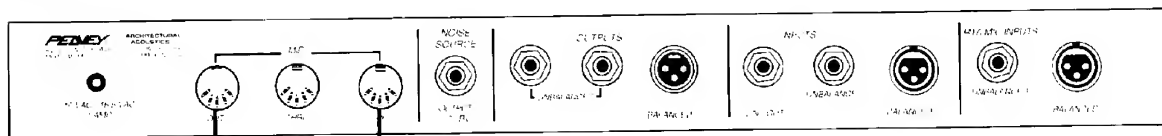
CEQ 28R

If more than one CEQ 28R is to be connected, they are CEQ 28R in a loop so that the MIDI output of each CEQ 28R is connected to the MIDI input of the next CEQ 28R. The MIDI output of the last CEQ 28R is then connected to the MIDI input of the CEQ 28.

Select the CEQ 28R to control:

Using the left < or > right cursor keys, position the blinking cursor to the left of the REMOTE-CH x label.

```
          LOCAL  *REMOTE-CH 1  EQ RANGE 12dB
EXIT    SUB ON  FB-FIND OFF   VIEW ANGLE Ø60
```

Now using the Up Λ or V down keys, select the channel of the CEQ 28R you wish to control. The CEQ 28R can be set to MIDI channels 1-16 which are displayed both on the CEQ 28R and CEQ 28 as follows:

CHANNEL		DISPLAY	CHANNEL		DISPLAY
1	-	1	9	-	9
2	-	2	10	-	A
3	-	3	11	-	B
4	-	4	12	-	C
5	-	5	13	-	D
6	-	6	14	-	E
7	-	7	15	-	F
8	-	8	16	-	G

To remotely control a CEQ 28R, move the blinking cursor to the left of the LOCAL label.

```
        *LOCAL  REMOTE-CH 2   EQ RANGE 12dB
EXIT    SUB ON  FB-FIND OFF   VIEW ANGLE Ø60
```

Now press either the UP Λ or V DOWN key to toggle from LOCAL mode (CEQ 28) or REMOTE mode (Selected Automate). The following display will momentarily appear:

```
               2 ON LINE
          SOFTWARE VERSION 1.ØØ
```

Then the following display:

```
        REMOTE  REMOTE-CH 2   EQ RANGE 12dB
EXIT    SUB ON  FB-FIND OFF   VIEW ANGLE Ø60
```

The buttons and display will now function and look like the CEQ 28, but the CEQ 28R is now being controlled.

If, however, the following display appears,

```
┌─────────────────────────────────────┐
│        A MIDI ERROR HAS OCCURRED!    │
│ EXIT      CEQ 28 DID NOT RESPOND     │
└─────────────────────────────────────┘
```

check to be sure that the MIDI cables are correctly connected, that you have selected the REMOTE-CH that corresponds to that of the CEQ 28R and that the Automate is not on the same channel as the CEQ 28.

Also, check to see that the CEQ 28 is set to receive System Exclusive commands.

7. EXIT the assign facility

NOTE: The system of using the < and > to move the cursor within the window and using the V or Λ cursor keys to change the parameter selected by the position of the pulsing star cursor will be repeated in most of the CEQ 28 displays.

To EXIT the assign facility, push the lower (EXIT) Softkey:
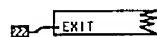
This will bring you back to the normal EQ display.

The MIDI Selector Key

Pressing this key gives you access to the MIDI function suite. The cursor keys will move the pulsing star around the display activating functions. This particular display page also utilizes the Softkeys to make selections.
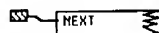
Press the MIDI selector key.

MIDI

You will see the MIDI selection display:

```
┌─────────────────────────────────────────────┐
│ NEXT MIDI FUNCTION:*CHANNEL  CONT CNTRL      │
│ EXIT  SWITCHES  SEND/RECEIVE  SYS EXCL       │
└─────────────────────────────────────────────┘
```

1. MIDI Channel Selection

Using any of the cursor keys, position the pulsing star indicator to the left of the CHANNEL select parameter (see above). Press the top (NEXT) Softkey:

You will enter the MIDI transmit/receive channel display:

```
┌─────────────────────────────────────┐
│         MIDI CHANNEL * 01            │
│ EXIT      OMNI MODE OFF              │
└─────────────────────────────────────┘
```

With the pulsing star indicator positioned as shown above, you may select MIDI channels 1 to 16 by pressing the Λ or V keys.

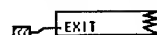If you use the < or > keys to place the pulsing star indicator to the left of the ON/OFF legend,

```
┌─────────────────────────────────────┐
│         MIDI CHANNEL   01            │
│ EXIT      OMNI MODE *OFF             │
└─────────────────────────────────────┘
```

the CEQ 28 will be in the OMNI ON/OFF function. By using the Λ or V keys you may switch the OMNI mode either On or Off.

Press the EXIT (lower) Softkey:

to get back to the MIDI function display.

2. Send/Receive Facility

Using the left/right < or > hand cursor keys, position the pulsing star indicator to the left of the SEND/RECEIVE legend.

```
┌─────────────────────────────────────────────┐
│ NEXT MIDI FUNCTION: CHANNEL  CONT CNTRL      │
│ EXIT  SWITCHES  *SEND/RECEIVE   SYS EXCL     │
└─────────────────────────────────────────────┘
```

Press the NEXT Softkey:

Here we can enable/disable the sending and/or the receiving of MIDI program change and Continuous Controller change functions, as well as the receiving of System Exclusive commands:

```
┌─────────────────────────────────────────────┐
│      RECV: *PG CHG Y  CC CHG Y  SYS EX Y     │
│ EXIT SEND:  PG CHG Y  CC CHG Y               │
└─────────────────────────────────────────────┘
```

The display interaction is identical to the previous examples. Y denotes the enabled condition and N denotes disabled. CC is the abbreviation for Continuous Controller. PG is the abbreviation for ProGram. Use the cursor keys to make the changes that you require.

When you are in the EQ display mode, you change the level of one of the EQ bands and if the Send Continuous Controller Data facility is enabled, the CEQ 28 will send MIDI continuous control data to the MIDI Out port.

If a second CEQ 28 unit is connected and correctly configured as a MIDI receiver, this information will automatically be transmitted to it and will effect the same changes that you make. Slider level, Overall Level, Subsonic ON/OFF and EQ range (6 or 12 dB) are all capable of MIDI transfer in this way. If Program Change is enabled, and Receive is also enabled on the other unit, the RECALL Command will send the appropriate Program Change to the other unit. A very useful application of these facilities will be found when using two CEQ 28s in a stereo EQ configuration where you may require all EQ changes to be reflected by the second unit.

NOTE: CEQ 28s **do not** accept MIDI commands when in the RTA mode or send a Program Change when you recall the last EQ. This is a protection mechanism for your EQ programs.

3. The MIDI Continuous Control display

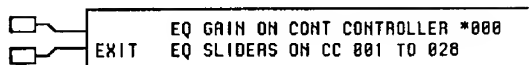Press the bottom (EXIT) Softkey:
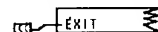
to get back to the MIDI function display.

Press the left/right < or > cursor keys to advance the display to the continuous controller parameter display:

```
┌─────────────────────────────────────────────┐
│ NEXT MIDI FUNCTION: CHANNEL *CONT CNTRL      │
│ EXIT  SWITCHES  SEND/RECEIVE   SYS EXCL      │
└─────────────────────────────────────────────┘
```

Press the top (NEXT) Softkey,

```
  ▣──┌─NEXT───┤ ≩
```

and you will enter the Continuous Controller display:

```
  ☐───┐    EQ GAIN ON CONT CONTROLLER *000
  ☐──┘ EXIT  EQ SLIDERS ON CC 001 TO 028
```

Each of the EQ sliders, EQ gain and bands can be individually controlled by MIDI. The continuous controller number to which these respond can be changed in this page. The range available is 0 to 120.

The 29 EQ sliders are arranged as one block of MIDI numbers. This block may be placed to start anywhere in the MIDI number range of 0 to 92. The unit's software will always keep them together as one unitary block. This is a convenience feature, so that these sliders do not become dispersed around all the MIDI numbers scheme. Ease of access is preserved in this way.

If you change the EQ gain controller number (∧ / ∨ cursor keys), you will find that the slider blocks move accordingly:

```
  ☐───┐    EQ GAIN ON CONT CONTROLLER *001
  ☐──┘ EXIT  EQ SLIDERS ON CC 002 TO 029
```
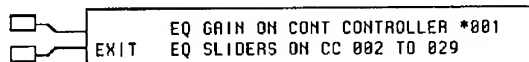
Here we have changed the gain MIDI controller number by means of the ∧ cursor key. Push the ∧ key once and see the change. Push the ∨ key once to reverse your action. As can be seen, the MIDI slider numbers have changed from 001 to 002 and 028 to 029. The whole block has moved upward together.

NOTE: You may notice, as you change the controller number, that the display will skip some blocks of numbers. This happens because the CEQ 28 checks for conflict between the Gain and EQ Slider block and the Subsonic and EQ Range MIDI controller switches and skips numbers that would cause more then one control to be assigned to one number.

4. MIDI Subsonic and EQ Range switches

The subsonic filter ON/OFF and EQ range facilities may be changed by using the external MIDI control, using the unit's built-in MIDI switches facility. Only the MIDI switch numbers are accessible in this display. The software will not allow a conflict between switch numbers and continuous controller numbers. Numerical designation of switch numbers may be any number between 0 and 120 that is not already occupied by a continuous controller facility numerical assignment. This MIDI numerical assignment facility is accessed by use of the MIDI display.
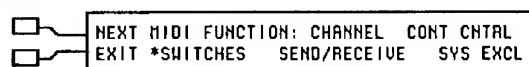
Press the EXIT Softkey,

```
  ▣──┤EXIT───┤ ≩
```
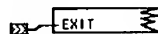
or the MIDI selector key,

▨▨
MIDI

and using the right/left hand < or > cursor keys, position the pulsing star indicator next to the SWITCHES legend:

```
  ☐───┐ NEXT MIDI FUNCTION: CHANNEL  CONT CNTRL
  ☐──┘ EXIT *SWITCHES   SEND/RECEIVE   SYS EXCL
```

Push the NEXT Softkey,

```
  ▣──┌─NEXT───┤ . ≩
```

and you will see this display:

```
  ☐───┐       SET MIDI SWITCHES:
  ☐──┘ EXIT  *SUBSONIC CC 064    EQ RANGE CC 065
```

Using the right/left < or > hand cursor keys to direct the pulsing star indicator, you may select either subsonic filter ON/OFF or EQ range facilities for MIDI switch number changes. When you are in correctly conformed MIDI communication with other CEQ 28 units, changes made in the transmitting unit will be reflected in all of the receiving units (see Send/Receive facility).

Push the EXIT Softkey,

```
  ▩──┤EXIT───┤ ≩
```

to return to the MIDI function display.

NOTE: Having changed the MIDI controller, switch numbers and other MIDI parameters during this exercise, we suggest that you reverse the procedure and change them back to the positions selected when you first started. In this way you will be assured (if you are using two CEQ 28s) that both units will be set up to interface with each other.

A quick method of resetting all of the user modifiable parameters contained within the unit is to perform a Factory, or hard, reset.

5. Factory reset

CAUTION: When the following action is performed, all of your changes will be replaced and the unit will be re-configured to factory settings and all Program Presets will be set flat (all stored curves will be lost). If you have information within the unit that you wish to keep, either perform a system dump to a disk drive based system settings, or make physical notes of these and curves, as they will be replaced with the original Factory data after this procedure is followed.

Turn the unit off by means of the On/Off switch on the front panel.

Push in and hold the two far left-hand selector keys (ASSIGN and MIDI).

While still holding these keys in, push the On/Off switch button, restoring power to the unit.
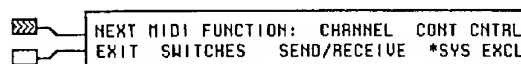
Release the ASSIGN and MIDI keys. The hard reset has now been performed.

If you have performed a hard reset, push the MIDI function key to get back to the MIDI display ready for the exercise.
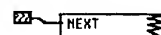
System exclusive Dump and Load

This is the area where we can perform Sysex (System Exclusive) dumping and loading to/from external systems, such as computers, sequencers etc., or from one CEQ 28 unit to another.

Using any of the four cursor keys, move the pulsing star indicator to the SYS EXCL position:

```
  ▨▨──┐ NEXT MIDI FUNCTION:  CHANNEL  CONT CNTRL
  ☐──┘ EXIT  SWITCHES    SEND/RECEIVE  *SYS EXCL
```

and press the NEXT Softkey.

```
  ▨──┌─NEXT───┤ ≩
```

The following window will appear:

```
  ┌───┐
  │   │    EXECUTE      SYSTEM EXCLUSIVE
  └───┤    EXIT  *DUMP PRESET 001  LOAD PRESET 001
```

With the pulsing selection star in the dump position, the CEQ 28 is prepared to dump information to an external system, or CEQ 28 unit. The cursor up/down keys will change the number of the preset to be dumped.

All presets, located between preset numbers 128 and 1, can be dumped by selecting ALL in the preset dump number position.

If a preset is being dumped from one CEQ 28 to another, provided the receiving CEQ 28 is listening on the **correct channel with the Receive of System Exclusive enabled,** and not in the RTA mode, nothing needs to be done to the receiving CEQ 28 to prepare it to load the dumped preset. If a dump is received in this fashion, the preset will be loaded into the same program number it originated from in the transmitting (actively dumping) unit. E.g., if you dump preset number 5 from one CEQ 28 to another, this preset will be loaded to the receiving CEQ 28 preset number 5.

If you dump ALL presets, all of the presets in the receiving unit will be replaced with the preset data from the sending (transmitting) unit.

If you wish to dump a preset from one CEQ 28 to another, and load it into a different preset number in the receiving unit:
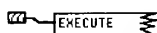
1) Select LOAD PRESET on the **receiving unit** (MIDI System Exclusive display):

```
  ┌───┐
  │   │    EXECUTE      SYSTEM EXCLUSIVE
  └───┤    EXIT  DUMP PRESET 005  *LOAD PRESET 001
```
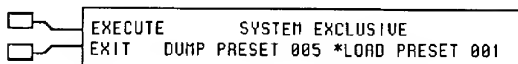
2) Configure the Preset number to conform to your required load-to number:

```
  ┌───┐
  │   │    EXECUTE      SYSTEM EXCLUSIVE
  └───┤    EXIT  DUMP PRESET 005  *LOAD PRESET 005
```
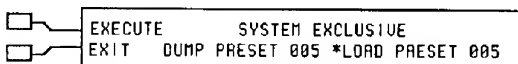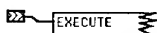
3) Press the EXECUTE (upper Softkey):

```
  ▨──┤EXECUTE  ≷
```

The MIDI 'WAITING FOR SYSTEM EXCLUSIVE' message will appear in the receiving unit's display:

```
  ┌───┐
  │   │           WAITING FOR
  └───┤    EXIT   SYSTEM EXCLUSIVE
```
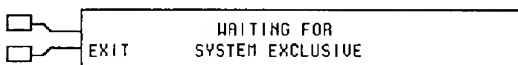
4) Press the top (EXECUTE) Softkey on the **transmitting CEQ 28** to dump the required preset into the receiving CEQ 28:

```
  ▨──┤EXECUTE  ≷
```

Both the transmitting and receiving CEQ 28 units' displays will respond by showing the message 'SYSTEM EXCLUSIVE IN PROGRESS' while they carry out this command.

This shows the operator that a successful dump is in progress. Dumping Presets between CEQ 28 units is a very useful facility when two units are used for EQ in a stereo system:

```
  ┌───┐
  │   │           SYSTEM EXCLUSIVE
  └───┤              IN PROGRESS
```
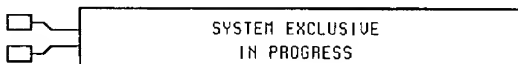
The transferred Preset will now be loaded into the required program Preset location (001 on the transmitting unit loaded to 005 on the receiving unit).

They will then revert to the original System exclusive Dump and Load display.

7. Recap, LOADing Information
When preparing a unit to *load* information, the message 'WAITING FOR SYSTEM EXCLUSIVE' will appear in the unit's display window upon pressing the execute Softkey:

```
  ┌───┐
  │   │           WAITING FOR
  └───┤    EXIT   SYSTEM EXCLUSIVE
```
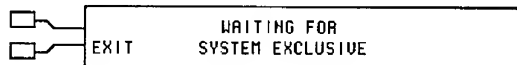
This message will cease to be displayed either upon the completion of information transfer (after display of the 'SYSTEM EXCLUSIVE IN PROGRESS' message), or upon pressing the EXIT Softkey.

NOTE: If a sysex dump is not carried out to completion, check to see that both units are on the same MIDI Channel (or in OMNI mode), that the receiving CEQ 28 has received System Exclusive data enabled and that all cables, connections etc. are correct and functional.

8. MIDI Program Change
When the CEQ 28 has completed reception of a MIDI Program Change, the following display will appear momentarily:

```
  ┌───┐
  │   │       MIDI RECALL OF PROGRAM 001
  └───┤              COMPLETE
```
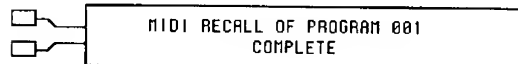
The MIDI Program Change number will be displayed on the screen and that Program Preset curve will be loaded into the equalizer. If the curve preset in the EQ when the Program Change was received was not stored, it will be automatically stored to preset 000 and named Last EQ.

NOTE: The CEQ 28 must be listening on the correct MIDI channel (or be in the Omni mode), have Receive Program Change enabled, and not be in the RTA mode to receive a MIDI Program Change.

THE EQ FACILITY

1. Create an EQ curve
This is a key feature of the unit's activities. Here we can make a new EQ curve. NOTE: For the purposes of these exercises only, it may be found best to make these changes of an exaggerated nature, so that the curve is easily recognizable when you come across it again later in the exercise. We have done this here.
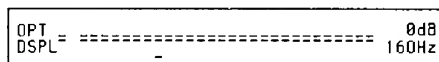
Example:

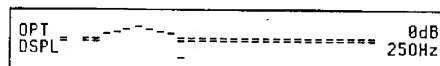Call up the EQ display by pressing the key marked 'EQ' selector key:

▨

EQ

This will invoke the EQ display similar to this one:

```
  ┌──────────────────────────────────────┐
  │ OPT                              0dB  │
  │ DSPL= ============================    │
  │                  -              160Hz │
  └──────────────────────────────────────┘
```

Using all four of the cursor keys, make some changes to this curve.

```
  ┌──────────────────────────────────────┐
  │ OPT    --- ----                  0dB  │
  │ DSPL= ** ==================== ======= │
  │                  -              250Hz │
  └──────────────────────────────────────┘
```
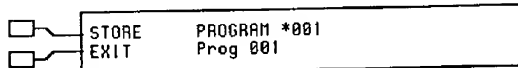
At this point, you can either press the STORE key (see below) or proceed to rename your curve (see Curve Program naming, also below, but after the next STORE section.)
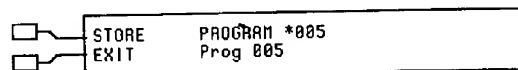
2. Store the curve (basic)

Press the STORE function select key:

▨▨▨
STORE

You will see this display:

```
┌─┐─┐ STORE     PROGRAM *001
└─┘─┤ EXIT      Prog 001
```

As you can see, the pulsing star indicator is positioned next to the curve program number. By using the Λ or V cursor keys, you can select the program number, where your curve will be STOREd.

```
┌─┐─┐ STORE     PROGRAM *005
└─┘─┤ EXIT      Prog 005
```

To perform this function, position the pulsing star indicator as shown above and using the cursor Λ or V keys, change the program number to the number of your choice. The STOREing operation will save an EQ curve for later RECALL.

At this point you can either: Press the STORE Softkey, or proceed with naming the curve (see under Curve/Program naming) that you are about to store.
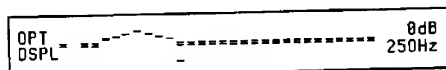
Press the top (STORE) Softkey to store this curve:

▨▨─┤STORE   ≋

Upon pressing the store key, the legend STORE COMPLETE will be displayed momentarily:

```
┌─┐─┐             STORE COMPLETE
└─┘─┤
```
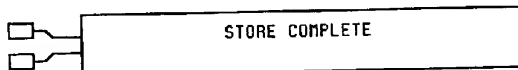
Your EQ curve has now been stored, and you will be returned to the display where you created your curve.

```
┌──────────────────────────────────┐
│ OPT  . .━━━━━ ━━━━━━━━━━━━━━━  0dB │
│ DSPL ━ ━              ━     250Hz │
└──────────────────────────────────┘
```

NOTE: Whenever the STORE Softkey is pressed, a store operation is carried out. In addition to storing the EQ curve, this STORE operation will also store the following parameters automatically every time that this is called up: Add On/Off, Add Program, EQ Range, Subsonic On/Off and the user label.

3. Curve/program naming

You may like to custom name a particular EQ curve, in order to make it easier to remember. If, for instance you regularly play a venue called 'Jims', you may like to name the EQ that you stored.

If you are not already in the STORE display, press the STORE selector key

▨▨▨
STORE

(do not press the **store** Softkey at this time):

```
┌──────────────────────────────────┐
│ STORE     PROGRAM *005            │
│ EXIT      Prog 005                │
└──────────────────────────────────┘
```

Using the right-hand > cursor key, move the pulsing star indicator until it rests to the left of the Prog legend. A small pulsing dash will appear under the first letter:

```
┌──────────────────────────────────┐
│ STORE     PROGRAM 005             │
│ EXIT      *Prog 005               │
│            ─                      │
└──────────────────────────────────┘
```

Using the Λ or V cursor keys will change the look of this first letter. You can scroll through a complete alpha-numeric suite to obtain the first letter that you require in your new name. When this first letter is as you desire it to be, push the right-hand > cursor key once again and the small pulsing dash will move to the next letter position. Select your letter using the above procedure and use the > to select the next letter for modification. Use this procedure over and over until you have completed all the changes that you require. When you have finished your renaming, press the STORE Softkey.

▨▨─┤STORE   ≋

The legend STORE COMPLETE will appear briefly:

```
┌─┐─┐             STORE COMPLETE
└─┘─┤
```
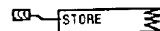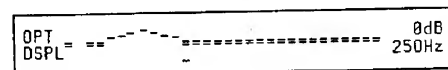
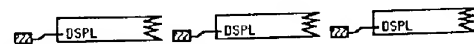Your renamed EQ curve (program) is now STOREd.

4. EQ Flat

There will be times when you wish to produce a flat EQ quickly and conveniently. If, for instance, you were in the routine outlined above, it may be that you wish to store your current curve to a different location (number), and then build up another fresh curve from flat. This is where you will find the EQ FLAT facility very useful.
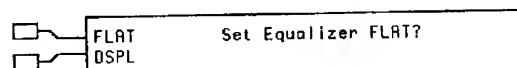
Here is the curve display that we were last working with:

```
┌──────────────────────────────────┐
│ OPT  . .━━━ ━━━━━━━━━━━━━━━━━  0dB │
│ DSPL ━ ━             ━      250Hz │
└──────────────────────────────────┘
```

Press the DPSL Softkey three times:

▨▨─┤DSPL ≋ ▨▨─┤DSPL ≋ ▨▨─┤DSPL ≋

You will see this display:

```
┌─┐─┐ FLAT      Set Equalizer FLAT?
└─┘─┤ DSPL
```
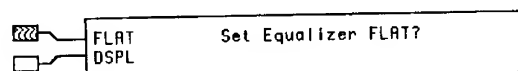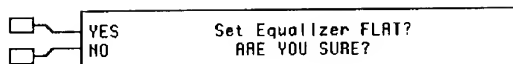
The CEQ 28 is asking you if you wish to flatten out this curve. It is a good idea at this point to ask yourself if you wish to keep this curve, and if so, whether you have already STOREd it.

Press the FLAT Softkey:

```
▨▨▨─┐ FLAT      Set Equalizer FLAT?
└─┘─┤ DSPL
```

You will see the second stage of this display:

```
┌──┐─┐ YES       Set Equalizer FLAT?
└──┘ │ NO          ARE YOU SURE?
┌──┐─┘
└──┘
```

Here the CEQ 28 is reminding you that if you did not store the curve, this is your last chance, before flattening it out. If you wish to flatten it out, press the YES Softkey. The unit will then flatten out your curve and return you to the EQ display with a flat EQ curve shown in it. You may now build up your new curve.

If you push the NO Softkey, you will be returned to the EQ display with your curve preserved intact.

Press the YES Softkey:

```
▨─┐ YES    ≩
```
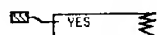
The following display will be shown:

```
OPT  _ ========================= 0dB
DSPL=           _              250Hz
```
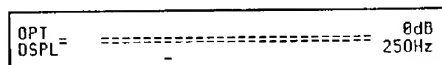
You can see that the curve has been flattened out.

5. RECALLing the previous curve (basic)

Press the RECALL selector key:

```
RECALL:   PROGRAM *007   ADD ---
EXIT      Prog 007
```
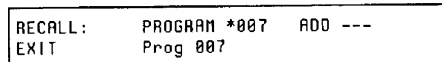
If the pulsing star indicator is not positioned next to the PROGRAM number, use the cursor < or > keys to place the pulsing star indicator in this position. Then, using the Λ or ν cursor keys, change the number in the recall window to your previously STOREd curve program number 005:

```
RECALL:   PROGRAM *005   ADD ---
EXIT      Jims
```
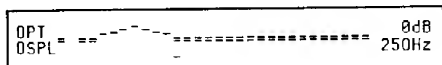
Press the RECALL Softkey:

```
▨─┐ RECALL   ≩
```
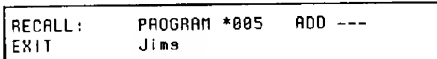
The RECALL complete display will momentarily appear:

```
        RECALL COMPLETE
```
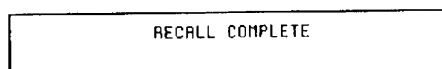
Your previous curve is now recalled. Press the EXIT Softkey and you will see it displayed:

```
OPT  _ ==⁻⁻⁻⁻⁻================== 0dB
DSPL=       _              250Hz
```

6. Making a new curve

Set up an EQ Flat curve as previously directed in **EQ FLAT.**
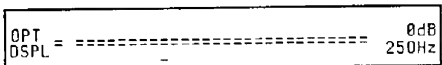
```
OPT  _ ========================= 0dB
DSPL=           _              250Hz
```

Using all four of the cursor keys, make some changes to this curve.

```
OPT  _ ===============----⁻⁻--==== 0dB
DSPL=                  _        1.6K
```

7. Compare curves

```
OPT  _ ==================⁻⁻⁻⁻--==== 0dB
DSPL=                  _        1.6K
```
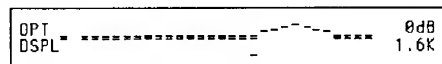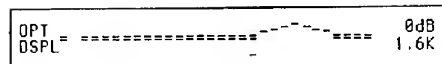
Press the top Softkey twice:

```
▨─┐ OPT  ≩  ▨─┐ NEXT  ≩
```
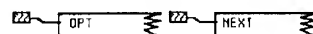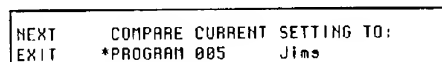
The display will now show you that it is ready to show the comparison between the current curve, and any of the stored Program Preset Curves.
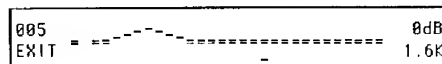
Change the number of the program to be compared by using the Λ or Λ cursor keys at this point. The label for the selected Program Number is also displayed.
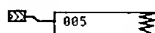
```
NEXT     COMPARE CURRENT SETTING TO:
EXIT      *PROGRAM 005    Jims
```

Press the NEXT Softkey once:

```
▨─┐ NEXT   ≩
```

The display window will now show you the compared curve and the EQ will be set to this curve:

```
005  _ ==⁻⁻⁻⁻================= 0dB
EXIT                _         1.6K
```

Press the top (005) Softkey (the top softkey label displays the Program Preset number that the current EQ curve is being compared to):

```
▨─┐ 005   ≩
```

Now you will see the CURRent curve:

```
CURR _ =================⁻⁻⁻---==== 0dB
EXIT                _          1.6K
```
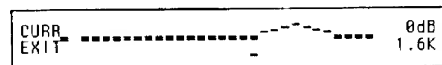
Every time that you press the top Softkey, you will toggle between the current and compared curves.

NOTE: The current (CURR) curve can be edited in the comparison display, but the 'compared' curve can not.

8. ADD two curves

Let us say, you have a particular sound you have created using an equalizer, but when you go to play at another venue, you have to recreate 'your sound' all over again because the EQ for this new room needs to be different. The CEQ 28 solves this problem by allowing you to store the 'room' EQ curve and 'effect' EQ curve separatley and then add the two together. When you play at a different venue, you can simply create a new 'room' EQ curve, add this to your 'effect' EQ curve and you have your sound.

9. The 'Transparent Window' technique

Once you equalize your sound system for the room you are in (room curve), this curve is no longer of any real interest. What becomes important are different 'effect' curves that you want to add to the 'room' curve. The CEQ 28 makes this easy by only displaying the effect curve and not the added room curve. The room curve is still 'there' and is being used, but it is transparent. To create an effect curve, ADD your room EQ to a flat EQ setting (the display will show flat). Now move the 'sliders' to create the effect. Although the two curves are combined in the equalizer they are still stored as two separate curves. Although the graphic display only shows the 'effect' curve, the actual amount of (dB) cut or boost is displayed in the upper right corner of the screen.

NOTE: The CEQ 28 has a +/- 12 dB max EQ capability, therefore, if you add curves that each contain +7 dB in the same band, the sum of +7 dB to +7 dB should be 14 dB. Due to the unit's 12 dB max. capability, you will 'peak out' at this 12 dB level. The same is true of subtractive EQ (e.g. -12 dB and -12 dB will yield the max. total of -12 dB, not -24 dB).

10. ADDing two curves example

Let us add the previously STOREd curve (Prog 5) to the curve we last created, but first STORE the current curve at Prog 7 (see the section on STORE if you need a little help).
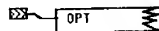
Press the EQ selector key:

EQ

You will see the EQ display of your curve, ready to have another curve ADDed to it.

Press the OPTions Softkey:

Using the right-hand cursor key > , move the pulsing star indicator across the display, until it is positioned next to the ADD legend:

```
NEXT     PROGRAM  007  *ADD ---
EXIT     Prog 007
```

At this time the ADD mode may be toggled On or Off using the ∧ or ∨ cursor keys:

```
NEXT     PROGRAM  007  *ADD ---
EXIT     Prog 007
```

ADD OFF

```
NEXT     PROGRAM  007  *ADD 001
EXIT     Prog 007        Prog 001
```

ADD ON

When an ADD is turned on, the 'ADDed' Program number and user label is displayed. To change the ADDed program number, you must be in the above display with the 'ADD' turned On.

Press the right-hand > cursor key once, and the pulsing star indicator will be positioned next to the ADD program number:

```
NEXT     PROGRAM  007  ADD *001
EXIT     Prog 007        Prog 001
```

Using the cursor ∧ or ∨ keys, select the EQ program that you wish to ADD.
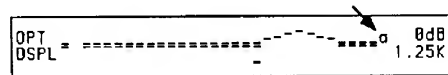
```
NEXT     PROGRAM  007  ADD *005
EXIT     Prog 007        Jims
```

Press the EXIT Softkey:

Your two programs have now been added together. You can see at a glance that this is an 'ADDed' curve, by the small letter 'a' displayed like this:

```
OPT  = ====================------.....a   0dB
DSPL                            -        1.25K
```

Using the ∧ or ∨ cursor keys move the cursor across the frequency bands. You will notice that when you get to a band where the added curve has a cut or boost, the level display in the top right-hand corner displays the actual level. Now raise and lower that band, while observing both the Curve display and the Level display in the corner. Perform this function a number of times until you feel comfortable with what is happening here.

11. Remaking an ADD

From the EQ display, press the Top Softkey (OPT). Using the < or > cursor keys, position the pulsing star indicator as shown:

```
NEXT     PROGRAM  007  *ADD 005
EXIT     Prog 007        Jims
```

By pressing the ∧ or ∨ cursor keys you will be able to turn the ADD off and on. The displays will look like this:

```
NEXT     PROGRAM  007  *ADD ---
EXIT     Prog 007
```

EXIT to the EQ display to see that the ADD is really removed.

For the purposes of the next exercise, turn the ADD back on:

12. STORE (basic and advanced)

Press the STORE selector key:

STORE

to bring up the store display (do not press the **STORE** Softkey at this time):

```
STORE:   PROGRAM *007  ADD 005
EXIT     Prog 007        Jims
```

If you wish, you may change the location number of your STOREd program. To do this, use the cursor < or > keys to position the pulsing star cursor to the left of the Program number:

Use the cursor ∧ or ∨ keys to change the Program number:

```
STORE:    PROGRAM *010   ADD 005
EXIT      Prog 010       Jims
```

If we pressed the STORE Softkey at this time, the new program number would be STOREd as number 010 in memory, but since we are going to use the previously selected Program number, change this back so that it reads like this:

```
STORE:    PROGRAM *007   ADD 005
EXIT      Prog 007       Jims
```

Using the right-hand cursor key, move the pulsing star indicator until it rests to the left of the 'Prog' legend. A small pusling dash will appear under the first letter:

```
STORE:    PROGRAM  007   ADD 005
EXIT      *Prog 007      Jims
```

Using the Λ or V cursor keys will change this first letter. You can scroll through a complete alpha-numeric suite to obtain the first letter that you require in your new name. When this first letter is as you desire, push the > cursor key once again and the small pulsing dash will move to the next letter position. Select your letter using the above procedure and use the < to select the next letter for modification (for the example we have used the word 'Practice'. Use this procedure over and over until you have completed all the changes that you require:

```
STORE:    PROGRAM  007   ADD 005
EXIT      *Practice      Jims
```

When you have finished your renaming, press the STORE Softkey.

The legend STORE COMPLETE will appear briefly:


```
          STORE COMPLETE
```
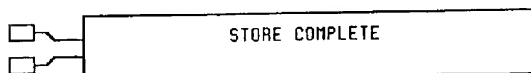
Your renamed EQ curve (program) is now STOREd.

NOTE: Whenever the STORE Softkey is pressed, a STORE operation is carried out. In addition to STOREing the EQ curve, this STORE operation will also STORE the following parameters: ADD On/Off, Add Programs, EQ Range, Subsonic On/Off and User Label.

13 RECALL (basic and advanced)
Press the RECALL Function Select key:

RECALL

You will see this display:

```
RECALL:   PROGRAM *007   ADD 005
EXIT      Practice       Jims
```

With the pulsing star indicator at the program number as shown above, the up/down cursor keys are used to select the Program Preset number that you wish to RECALL. If the Program was Stored with an ADD, the display will appear as above.

If you wish to RECALL a program preset as STOREd, press the RECALL Softkey:

The RECALL COMPLETE legend appears in the display, then returns to the RECALL page.

Pressing EXIT, or pressing the EQ key, will return you to the EQ display.

NOTE: Whenever the RECALL Softkey is pressed, a RECALL operation is carried out:

Here are these parameters RECALLed:

The EQ curve
EQ gain
ADD Program On/Off
ADD Program number
EQ range
Subsonic On/Off
User Label

If you wish to RECALL a program, but wish to change the ADD On/Off, press the > cursor key to position the pulsing star indicator to the left of the ADD legend. Use the Λ or V keys to turn the ADD On/Off. If you wish to ADD a different preset, press the > cursor key once more, so that the pulsing star indicator is next to the ADD program number:

```
STORE:    PROGRAM  007   ADD*005
EXIT      Practice       Jims
```

The Λ or V keys can now be used to change the ADD Program number. When you have everything set up to your satisfaction, press the RECALL Softkey:

You may now EXIT to the EQ display.

14. RECALL Flat:
The RECALL facility may also be used to RECALL a 'Flat' curve. Simply select an unused Preset and press RECALL. The 128 Program Presets are initialized as flat curves at the factory. RECALLing a flat curve via MIDI is an easy way to provide a 'MIDI Bypass.'

15. RECALL last EQ
Whenever a new Program is recalled, if the curve that is currently in the EQ has not been STOREd, it is automatically STOREd to program Preset 000 which is called 'Last EQ'. This prevents your curves from being accidentally lost. To RECALL the 'Last EQ', select Program 000, and press the RECALL Softkey. When the last EQ curve is RECALLed, the curve currently in the EQ will be lost if it has not been previously STOREd by you, so please be careful!
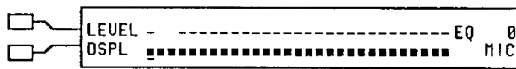
THE RTA FACILITY
1. General
This facility is mainly concerned with external (Mic) analysis of an area. Press the 'RTA' selector key:

RTA

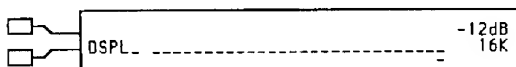You have now invoked the main RTA display:

When entering the RTA facility, the EQ is automatically placed in the BYPASS mode, and the RTA microphone input is connected to the EQ and RTA. The Subsonic Filter, if on, is still in the EQ BYPASS circuit, so that your loudspeakers are not receiving low frequency signals (below 40 Hz).

If you move the flashing line cursor all the way to the left of the RTA display, you will see the RTA Mic display:

```
┌─┐   ┌─────────────────────────────────┐
│ │──┤LEUEL _ ------------------------EQ  B│
└─┘  ┌┤OSPL ■■■■■■■■■■■■■■■■■■■■■■■■■■■■  MIC│
┌─┐──┘└─────────────────────────────────┘
└─┘
```

This display is easily picked out from the regular RTA display, because the legend MIC appears in the lower right-hand corner. You can now adjust the microphone's gain. Pressing the ∧ key increases the microphone gain and raises the RTA level, while pressing the ∨ key reduces both of these. If the DECAY is set for MEDium or SLOW, it takes a moment for the RTA to respond to a change in gain.

Pressing the DiSPLay Softkey takes you to the single full-height RTA display:

```
┌─┐   ┌─────────────────────────────────┐
│ │──┤                            -12dB  │
└─┘  ┌┤OSPL_ ------------------------ ‗  16K│
┌─┐──┘└─────────────────────────────────┘
└─┘
```

In both of the RTA displays the far left band displays the full band signal level (20 Hz to 20 kHz). The microphone is also adjusted with the flashing cursor in this position.
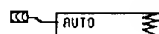
To gain access to the RTA Parameters, and the Auto EQ functions, press the RTA function selection key a second time:

<div align="center">

▨▨▨

RTA

</div>

```
┌─┐   ┌─────────────────────────────────┐
│ │──┤AUTO  RTA PARAMETER:              │
└─┘  ┌┤EXIT  *SLOW DECAY DISPLAY RANGE 24dB│
┌─┐──┘└─────────────────────────────────┘
└─┘
```
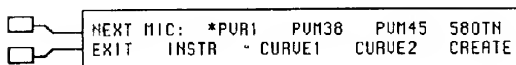
In this display, you can set the RTA DECAY rate (SLOW, MEDium, or FAST) and the RTA Range (24 dB or 12 dB). When looking at Pink Noise, the SLOW Decay is recommended.

2. Microphone and curve facilities
Press the top (AUTO) Softkey:

<div align="center">

▨▨─┤AUTO   ≋

</div>

A new display will reveal itself:

```
┌─┐   ┌─────────────────────────────────────┐
│ │──┤NEXT MIC:  *PVR1   PVM38   PVM45  580TN│
└─┘  ┌┤EXIT  INSTR  ‴ CURVE1  CURVE2  CREATE│
┌─┐──┘└─────────────────────────────────────┘
└─┘
```

WARNING: Selection of sampling microphone.

Wherever possible, avoid the use of directional microphones for EQ sampling purposes. A directional microphone generally exhibits a different frequency response pickup pattern in the front and back. When used as a sampling microphone in a room, the microphone picks up sound not only directly from the loudspeaker to the microphone, but also from reflections and reverberations generated within the room space. A directional microphone would give an inaccurate representation of the system/room response that will vary with distance from the loudspeaker. Close to the loudspeaker, the sound source will be primarily direct from the loudspeaker, and the microphone's on-axis response will predominate. Farther away from the speaker system (as you move further out into the reverberant field) both the on-axis and off-axis microphone responses will influence the RTA response.

An omnidirectional microphone is therefore recommended for use with the CEQ 28.

The PVR 1 is an omnidirectional microphone with a smooth, fairly flat response and is recommended. Other Peavey directional microphone response curves are also included in the CEQ 28 for your convenience, but the results may be somewhat unpredictable, especially in large rooms.

If you have another microphone that you wish to use for EQ sampling purposes, you can enter its frequency response (from data sheets etc.) into the CEQ 28. You may find that the curve you entered was inaccurate, but the curves that you obtain when performing auto-EQ should be consistent from one occasion to the next. You can, therefore, adjust either the microphone, or the room target curve, to obtain the required results.

The microphone curves stored in the CEQ 28 are an average response curve and individual microphones may differ slightly from these curves.

This is the display that you will use to access all of your external EQ sources. Here are the definitions of the legends shown:

PVR1 - This curve is set up to compensate for the Peavey Electronics PRV™ 1 microphone. This is the recommended omnidirectional microphone.

PVM38 - This curve is set up to compensate for the Peavey Electronics PVM™ 38 microphone.
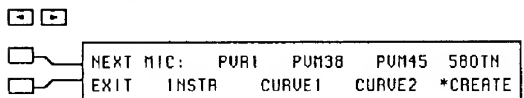
PVM45 - This curve is set up to compensate for the Peavey Electronics PVM™ 45 microphone.

580TN - This curve is set up to compensate for the Peavey Electronics PVM™ 580TN microphone.
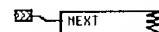
INSTR - This is a flat curve specially made available for instrument microphones.

CURVE 1, CURVE 2 - These locations can be used for custom microphone curves. NOTE: All microphone and other curves are stored in ROM (Read Only Memory) and are not user storable. Modified versions of these curves can be stored to the Curve 1 or Curve 2 locations.
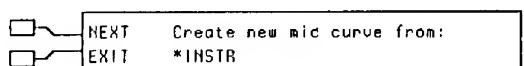
CREATE - When this option is selected, you will be shown a typical window where you can create your own microphone curve. Use the left/right < or > softkeys to move the pulsing star indicator to the CREATE legend:

<div align="center">

◁· ▷·

</div>

```
┌─┐   ┌─────────────────────────────────────┐
│ │──┤NEXT MIC:   PVR1   PVM38   PVM45  580TN│
└─┘  ┌┤EXIT  INSTR   CURVE1  CURVE2  *CREATE│
┌─┐──┘└─────────────────────────────────────┘
└─┘
```

Press the NEXT Softkey:

<div align="center">

▨▨─┤NEXT   ≋

</div>

The next display shows:

```
┌─┐   ┌─────────────────────────────────────┐
│ │──┤NEXT   Create new mic curve from:     │
└─┘  ┌┤EXIT   *INSTR                         │
┌─┐──┘└─────────────────────────────────────┘
└─┘
```
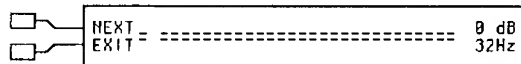
You can choose from a selection of microphone curves in this display by pushing the cursor up/down Λ or V keys. You will find the selection to be PVR1, PVM45, PVM38, 580TN, CURVE1, CURVE2 and INSTR.

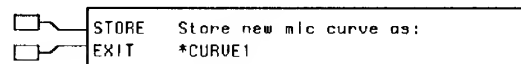Position the pulsing star indicator to the INSTR curve, as shown above. Press the NEXT Softkey. You will now see the Flat INSTR mic curve:

```
┌──┐─┐ NEXT ─ ============================ 8 dB
└──┘─┘ EXIT = ============================ 32Hz
```

Curve taken from PVM45 in CREATE display:

```
┌──┐─┐ NEXT          _------------‾‾‾‾--~ -6.0dB
└──┘─┘ EXIT   -----_-‾                   - 32Hz
```
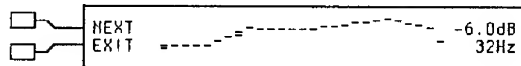
After creating the desired mic curve, press the NEXT Softkey:

```
┌──┐─┐ STORE    Store new mic curve as:
└──┘─┘ EXIT     *CURVE1
```

Use the cursor up/down Λ or V keys to select your curve. You can now STORE your mic curve as CURVE1 or CURVE2.

Press the STORE Softkey to STORE your curve, or press the EXIT Softkey to return to the microphone selection display.

Press the EXIT Softkey:

```
▭─┌EXIT    ≷
```
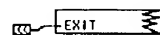
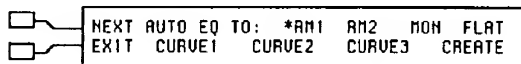Using the right/left cursor keys < > , position the pulsing star indicator next to the PVR1 legend:

```
┌──┐─┐ NEXT MIC:  *PVR1   PVM38   PVM45  580TN
└──┘─┘ EXIT    INSTR1   CURVE1   CURVE2  CREATE
```

Press the NEXT Softkey:

```
▩─┌NEXT    ≷
```
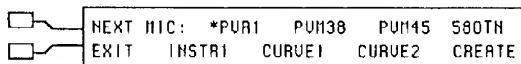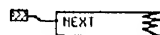
3. Room Curve Selection
Now you will see this window:

```
┌──┐─┐ NEXT AUTO EQ TO:  *RM1   RM2   MON   FLAT
└──┘─┘ EXIT   CURVE1    CURVE2   CURVE3  CREATE
```

As sound travels from its source, high frequencies are attenuated at a faster rate than low or mid frequencies. This absorption (attenuation) of High frequencies is one of the clues that we use to determine how far away the sound source is. For this reason, we seldom want to equalize a sound system to a totally flat characteristic to the listeners' ears, as it will tend to sound unnaturally bright. Generally we wish to augment the EQ curve with a gentle high frequency roll-off that simulates a natural HF roll-off effect. The application (sound reinforcement, monitoring etc.), the size of the room and the type of music will all influence the choice of the target curve.

The CEQ 28 provides you with several target room curves or you can create your own.

Here are the definitions of the sound curve legends shown in the above display:

RM1 - Flat to 1 kHz and then 2 dB per octave slope. This curve represents the physical realities of HF air-attenuation and LF roll-off.

RM2 - Flat to 1.6 kHz and then 3 dB per octave slope (roll-off).

MON - Has been determined to an optimal jump-off point for Monitor EQ curves.

FLAT - A flat EQ.

CURVE 1 - User-creatable curve storage location.

CURVE 2 - User-creatable curve storage location.

CURVE 3 - User-creatable curve storage location.

CREATE - When this option is selected, you can create your own target room curve in the same way that you previously created a microphone curve.

4. Selection and actions of the above - sampling displays
Position the pulsing star indicator so that it is next to the RM1 legend. Press the top (NEXT) Softkey:
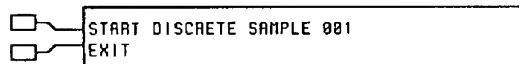
```
▩─┌NEXT    ≷
```

This display will be shown:

```
┌──┐─┐ NEXT *DISCRETE SAMPLES
└──┘─┘ EXIT   CONTINUOUS SAMPLES
```
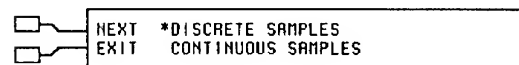
You have two selection options here—DISCRETE SAMPLES or CONTINUOUS SAMPLES. If you select DISCRETE, and press the NEXT Softkey,

```
▩─┌NEXT    ≷
```
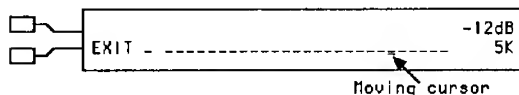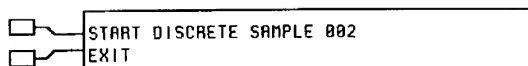
you will see this display:

```
┌──┐─┐ START DISCRETE SAMPLE 001
└──┘─┘ EXIT
```

Press the START Softkey,

```
▩─┌START    ≷
```

and the unit will start to sample. Here is the sampling display:

```
┌──┐─┐                                    -12dB
└──┘─┘ EXIT _ ---------------------_------ 5K
```
Moving cursor

The unit uses a sophisticated algorithm to adjust the equalizer so that the RTA response matches the target curve. This algorithm specifically looks for peak differences between the RTA and target response, and adjusts these first.

If you wish to abort an auto-equalization sample that is currently in progress, press the EXIT softkey.
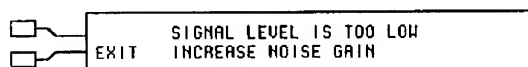
At the completion of this first auto-equalization sample, which takes approximately one minute, the display will look like this:

```
┌─────────────────────────────────────────┐
│ START DISCRETE SAMPLE 002                │
│ EXIT                                      │
└─────────────────────────────────────────┘
```

At this point, you would reposition the sample microphone and press the START Softkey to take the next sample. At the end of each successive sample, the newly created curve is weighted and combined with the previous curve, e.g. after the third sample is finished, the new curve is combined with the previously averaged sample (1 & 2) and each sample is given 1/3 weighting.

When you have completed the discrete auto equalization process, you can quit by pressing the EXIT softkey or by pressing a function key (EQ etc).

NOTE: If you have a signal that is too weak, or if there is no signal present (perhaps due to a misconnection), the unit will show the following window:

```
┌─────────────────────────────────────────┐
│         SIGNAL LEVEL IS TOO LOW          │
│ EXIT    INCREASE NOISE GAIN              │
└─────────────────────────────────────────┘
```

If this event occurs, check the signal level and continuity, and/or the noise level gain. If the signal is too high, then a display message will show SIGNAL LEVEL IS TOO HIGH DECREASE NOISE GAIN.

Back out of this display by pushing the 'RTA' key twice, you will now be back at this display:

```
┌─────────────────────────────────────────┐
│ AUTO    RTA PARAMETER:                    │
│ EXIT    *SLOW DECAY DISPLAY RANGE 24dB   │
└─────────────────────────────────────────┘
```
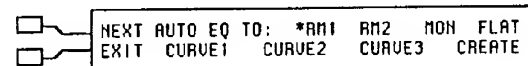
Press the top (AUTO) Softkey:

```
   ▭──┤AUTO      ⪼
```

This display will be seen again:

```
┌─────────────────────────────────────────┐
│ NEXT MIC:  *PUR1    PUM38    PUM45  560TH│
│ EXIT   INSTR    CURVE1    CURVE2   CREATE│
└─────────────────────────────────────────┘
```

Press the NEXT Softkey:

```
   ▭──┤NEXT      ⪼
```
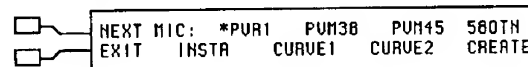
You'll pass through this display

```
┌─────────────────────────────────────────┐
│ NEXT AUTO EQ TO:  *RM1   RM2   MON  FLAT │
│ EXIT   CURVE1    CURVE2   CURVE3   CREATE│
└─────────────────────────────────────────┘
```

by pressing the NEXT Softkey once again:

```
   ▭──┤NEXT      ⪼
```

This display will be seen again:

```
┌─────────────────────────────────────────┐
│ NEXT   *DISCRETE SAMPLES                  │
│ EXIT    CONTINUOUS SAMPLES                │
└─────────────────────────────────────────┘
```
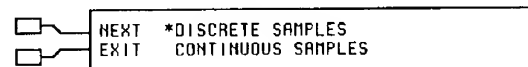
Use the ∧ or ∨ cursor keys to position the pulsing star indicator next to the legend
CONTINUOUS SAMPLES:

```
┌─────────────────────────────────────────┐
│ NEXT    DISCRETE SAMPLES                  │
│ EXIT    *CONTINUOUS SAMPLES               │
└─────────────────────────────────────────┘
```

Press the NEXT Softkey,

```
   ▭──┤NEXT      ⪼
```

you will see this display:

```
┌─────────────────────────────────────────┐
│ START CONTINUOUS SAMPLE                   │
│ EXIT                                      │
└─────────────────────────────────────────┘
```

Press the START Softkey:

```
   ▭──┤START     ⪼
```
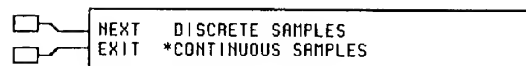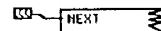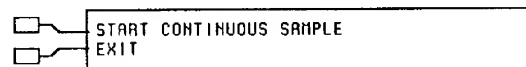
The display changes to read:
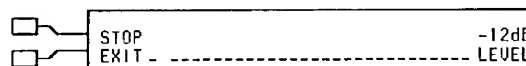
```
┌─────────────────────────────────────────┐
│ STOP                               -12dB │
│ EXIT ----------------------------- LEVEL │
└─────────────────────────────────────────┘
```

NOTE: If you have a signal that is too weak, or if there is no signal present (perhaps due to a misconnection), the unit will show the following window:

```
┌─────────────────────────────────────────┐
│         SIGNAL LEVEL IS TOO LOW          │
│ EXIT    INCREASE NOISE GAIN              │
└─────────────────────────────────────────┘
```
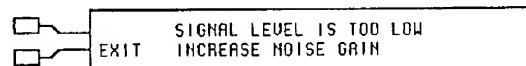
If this event occurs, check the signal level and continuity, and/or the noise level gain. If the signal is too high, then a display message will show SIGNAL LEVEL IS TOO HIGH DECREASE NOISE GAIN.

Press the EXIT Softkey three times to go back to the RTA display, or press the RTA function selector key.

```
 ▭──┤EXIT   ⪼ ▭──┤EXIT   ⪼ ▭──┤EXIT   ⪼
```
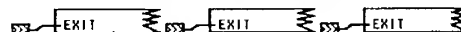
THE EQ PROCEDURE - SAMPLING STEP BY STEP

1. General Microphones and Microphone Placement

We now reach the area where we will EQ an actual room, but first a word concerning different types of microphones. If possible avoid the use of directional microphones for EQ sampling purposes. A directional microphone will give an unbalanced response, because it picks up differently from both its back and its front. The back response will not provide a true EQ reading, and although the CEQ 28 will appear to have equalized to the target curve, the result will not be accurate. The correct type of microphone is an omnidirectional device.

The goal of equalization in a room is to achieve a system response that is valid for a wide listening area. To achieve this, the microphone needs to be carefully placed and samples taken, by placing the microphone in several different locations within the room. The best area to take these samples from, falls within an oval-shaped pattern, which will be found from a little under ¼ to just over ½ the way to the back of the room (20% to 65% of the room length) and no closer than seven feet from any side walls. The microphone should be set at varying 'ear level' heights within this area (approximately 3½ to 6 feet from the floor for a standing audience). This will generally provide representative samples that are not in the loudspeakers' 'near field'; not too far into the reverberant field; and avoid strong side wall reflections.

2. Step by step

Connect the pink noise generator source to the sound system, and turn up the volume until other ambient noises have been masked.

Connect your microphone of choice to the RTA mic input. If phantom power is needed, the XLR input will provide this (+12V DC).

Set the microphone out in the room, placing it where you have chosen to extract your first sample (see the above microphone placement section for details).
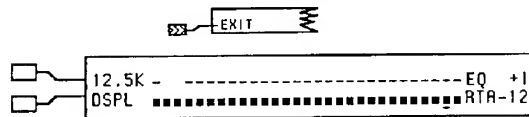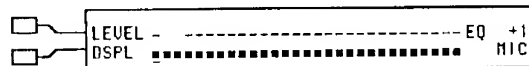
Push the RTA key twice:

RTA RTA

You will see this display:

```
┌────────────────────────────────────────┐
│ AUTO  RTA PARAMETER:                    │
│ EXIT  *SLOW DECAY DISPLAY RANGE 24dB    │
└────────────────────────────────────────┘
```

If the display does not read SLOW DECAY, use the cursor Λ or V keys to reset the decay legend, until it does read SLOW DECAY. Push the EXIT Softkey to enter the RTA display:

```
EXIT
```

```
┌────────────────────────────────────────┐
│ 12.5K - ------------------------EQ  +I  │
│ DSPL ■■■■■■■■■■■■■■■■■■■■■■■■■■■■RTA-12   │
└────────────────────────────────────────┘
```

Using the left-hand cursor key, move the flashing indicator to the extreme left until the legend LEVEL appears in the top left-hand display corner, and MIC is seen in the lower display right:

```
┌────────────────────────────────────────┐
│ LEVEL - ------------------------EQ  +I  │
│ DSPL ■■■■■■■■■■■■■■■■■■■■■■■■■■■■■  MIC   │
└────────────────────────────────────────┘
```

Adjust the microphone level by moving the cursor keys until the RTA display shows activity in the middle of the scale.

Shut the noise off temporarily, and check that the display returns to zero. This ensures that the microphone is not set at such a high level that it is receiving interference from ambient noise.

You may prefer to reverse this procedure, by connecting and placing the microphone, then adjusting the microphone level to zero ambient noise pickup, before turning up the pink noise source to show the correct level on the RTA display. This is also a good and acceptable procedure.

3. Discrete Mode Sampling

NOTE: When you start discrete sampling, the unit begins with flat slider settings. If you have been making/ modifying a curve, and have not STOREd it previous to starting to sample, it will automatically be STOREd to program number 0. Thus your last modified curve will be STOREd safely. This only applies to freshly created, or modified curves.
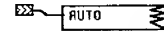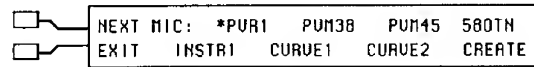
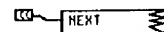Press the RTA key:

RTA

and enter the RTA PARAMETER display:

```
┌────────────────────────────────────────┐
│ AUTO  RTA PARAMETER:                    │
│ EXIT  *SLOW DECAY DISPLAY RANGE 24dB    │
└────────────────────────────────────────┘
```

Press the AUTO Softkey:

```
AUTO
```

to enter the curve selection display:

```
┌──────────────────────────────────────────────┐
│ NEXT MIC:  *PUR1   PUM38   PUM45   580TN       │
│ EXIT  INSTR1   CURVE1   CURVE2   CREATE        │
└──────────────────────────────────────────────┘
```

Select your desired microphone curve.
Press the NEXT Softkey:

```
NEXT
```

to enter the room selection display:

```
┌──────────────────────────────────────────────┐
│ NEXT AUTO EQ TO:  *RM1   RM2   MON   FLAT      │
│ EXIT  CURVE1   CURVE2   CURVE3   CREATE        │
└──────────────────────────────────────────────┘
```
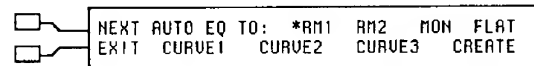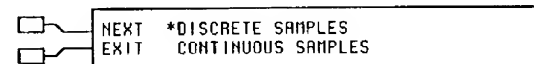
Using the left/right < or > cursor keys, select your room or target curve.
Press the NEXT Softkey again:

```
NEXT
```
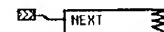
You will now enter the Sample Mode selection display:

```
┌──────────────────────────────────────────────┐
│ NEXT  *DISCRETE SAMPLES                        │
│ EXIT   CONTINUOUS SAMPLES                      │
└──────────────────────────────────────────────┘
```

Using the cursor keys, select the DISCRETE SAMPLES parameter. Press the NEXT key again:

```
NEXT
```
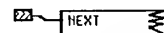
to enter the Sample Start display:

```
┌──────────────────────────────────────────────┐
│ START DISCRETE SAMPLE 001                      │
│ EXIT                                           │
└──────────────────────────────────────────────┘
```

When you wish to start your first sample, press the START Softkey:

```
START
```

The unit will now start the first sample. You will be able to see that it is sampling, as the flashing indicator will pan from left to right across the frequency bands in the sampling display, and the frequency indicator in the lower right hand side of the display will change as the cursor runs across each band.

```
┌──────────────────────────────────────────────┐
│                                         -12dB  │
│ EXIT - --------------------------------  5K    │
└──────────────────────────────────────────────┘
```

Moving cursor
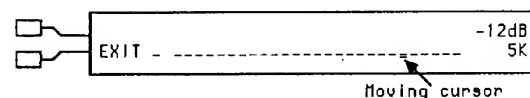
The unit will stay in this display mode for approx. 60 seconds while it attempts to match the target curve. If the CEQ 28 can not match the target curve, the problem may be beyond the ability of a graphic EQ of any kind.

NOTE: The unit will automatically adjust the microphone level to give a suitable yield for optimum performance. If the pink noise level is not correct (too high or too low) the unit will display a message informing you of this condition. Adjust the pink noise output level to rectify the condition pointed out in the above message.

Move in the microphone to the next room location where you wish to record your next sample and press the START key again to begin recording the next sample. You may make virtually as many discrete samples as you require, as the unit will carry up to 128 samples in its memory (it is rare to exceed 16 samples for a given room). It is important that you take at least three different samples, as there are often room anomalies that would give an inaccurate response, if only one sample were taken.

Every time that the unit records a discrete sample, it compares the current sample with each of the previous samples, weighting each sample equally in proportion to the others (e.g. if you have two samples, it will weigh each sample as a 50% value, 10 samples would each receive a 10% weighted value each, and so forth).

If you push the EXIT Softkey while a sample is still in progress (abort) the unit will abort the current sample and prepare to retake it (sample display re-appears). This is useful should a sudden loud noise, or loss of pink noise level occur while sampling is in progress (this would upset the balance of any particular sample). Otherwise the CEQ 28 will complete its auto-equalization procedure and prepare for the next sample.

Having completed your last sample, push the EXIT Softkey. This will take you back to the Sample Mode Selection display:

```
 ▭—⌐  NEXT  *DISCRETE SAMPLES
 ▭—⌐  EXIT   CONTINUOUS SAMPLES
```
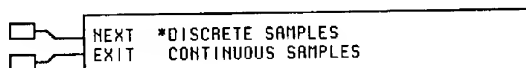
4. Continuous Mode Sampling

NOTE: The continuous mode should not be used as the sole method of auto equalization.

You now have the option to cease sampling, or to make a continuous sample. The reason for making a Continuous sample is to 'brush-up', or smooth the curve that your collection of discrete samples has just made. It may be found convenient to think of this as the 'final touch' to your room EQ exercise. If this stage is omitted, the result will not be as precise an EQ curve fit as it could be. We therefore recommend that you follow through with a continuous sample. Having pressed the EXIT Softkey at the conclusion of your last discrete sample, you will now be back in the Sample selection display:
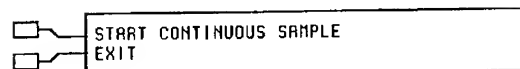
```
 ▭—⌐  NEXT  *DISCRETE SAMPLES
 ▭—⌐  EXIT   CONTINUOUS SAMPLES
```
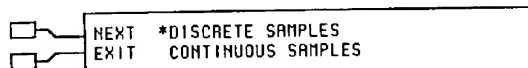
Press any cursor key to bring the pulsing star indicator to the left of the CONTINUOUS SAMPLE legend:

```
 ▭—⌐  NEXT   DISCRETE SAMPLES
 ▭—⌐  EXIT  *CONTINUOUS SAMPLES
```

Press the NEXT Softkey:

```
 ▭—⌐ NEXT   ≋
```
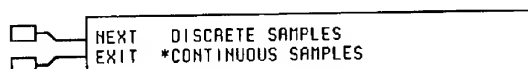
and you will arrive at the Continuous sample display:

```
 ▭—⌐  START CONTINUOUS SAMPLE
 ▭—⌐  EXIT
```

Press the START Softkey and continuous sampling will begin; the display will change to the Continuous sampling display:

```
 ▭—⌐  STOP                              -12dB
 ▭—⌐  EXIT _ ------------------------ 800HZ
```
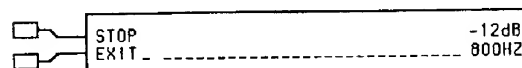
The flashing cursor will move across the frequency bands, and the frequency band numbers will change, indicating that sampling is taking place.

It is normal practice to walk around the room with the microphone while obtaining a continuous sample. Pick up the microphone in such a way that handling noise is not excessive, as this may upset the sample. Replace the microphone when you consider that you have gathered enough of a sample (when you have walked through most of the room - approximately one to five minutes).

Press the EXIT Softkey to abort continuous sampling, or STOP to end your continuous sample. Averaging between the Discrete and Continuous samples will now be performed.

When the auto EQ process is complete, return to the EQ display by either using the EXIT Softkeys, or by pressing the EQ mode selector button. It is always a good idea to examine the automatically generated equalizer settings to see if some changes need to be made. For example if your speaker system rolls off below 80 Hz, the equalizer may have to use large amounts of boost to keep the low bands full.

NOTE: A 3 dB increase in level uses twice as much amplifier power at that frequency band. When the boost is at low frequencies, and there is a great deal of bass in the sound source, you may lose system headroom. For this reason it is also advisable to use a subsonic filter for most reinforcement applications.

5. Upper/Lower Frequency Band Manual Adjustment

You may wish to adjust these (particularly the 16 kHz band) by ear to suit your taste, the type of music being played, and the size and characteristics of the room. Depending on the microphone that you use, you may need to manually adjust the low frequency bands (probably in the 'cut' direction) because the microphone may not respond well at these frequencies.

NOTE: Both the top and bottom (32 Hz and 16 kHz) are shelving filters.

Security Lock

The controls on the CEQ 28 can be locked to prevent unauthorized persons from making adjustments to the equalizer. When locked, an access code must be entered to gain access to the controls. After the correct code has been entered, the unit operates as normal until the power is turned off. Each time the power is turned on, the access code must be re-entered to adjust the unit.

Enter Access Code (Lock On)

Pressing any key will bring up the following display.

```
ENTER     Equalizer is Locked
EXIT      Enter Axcess Code 0000
```

Use the UP or DOWN keys to change a digit and the LEFT or RIGHT keys to move the underline cursor to a different digit. When you have the access code entered, press the 'ENTER' soft key. If the correct code was entered the EQ display will appear and the CEQ 28 will operate as normal until turned off. Each time the unit is turned on when the lock is enabled, the access code must be entered to change EQ settings. If an incorrect access code is entered, the display will momentarily show

```
                  ACCESS DENIED
```

and then return to the enter access code display. If a key is not pressed for about 20 seconds or if the 'EXIT' key is pressed, the EQ curve to return to the display.

Enable/Disable Lock or Change Access Code

Press and hold the 'ASSIGN' and Bottom 'SOFT KEY' while the power is turned on. The following display will appear.

```
ENTER     Equalizer is Locked
EXIT      Enter Axcess Code 0000
```

Use the cursor keys to enter the 4 digit access code. If you are setting the access code for the first time, the factoy set access code is 0000. Next, press the 'ENTER' soft key. The following display will appear.

```
OK     THE SECURITY LOCK IS: *DISABLED
       CHANGE ACCESS CODE TO: 0000
```

With the cursor to the left of 'DISABLED' as shown, use either the UP or DOWN cursor keys to toggle the lock between Disabled and Enabled.

To change the access code, press the 'RIGHT' cursor key

```
OK     THE SECURITY LOCK IS: ENABLED
       CHANGE ACCESS CODE TO: *0000
```

The LEFT and RIGHT cursor keys move the underline cursor to the digit you wish to change. The UP and DOWN keys change the selected digit. When everything is set the way you want it, press the 'OK' soft key.

WARNING!!!
When you change the access code, be sure to write it down and store it somewhere safe. The code must be entered to adjust the equalizer, change the access code and to turn the lock on or off.

BLOCK DIAGRAM

This block diagram shows signal flow within the unit. In order to thoroughly understand the unit's functions, please study the block diagram carefully.
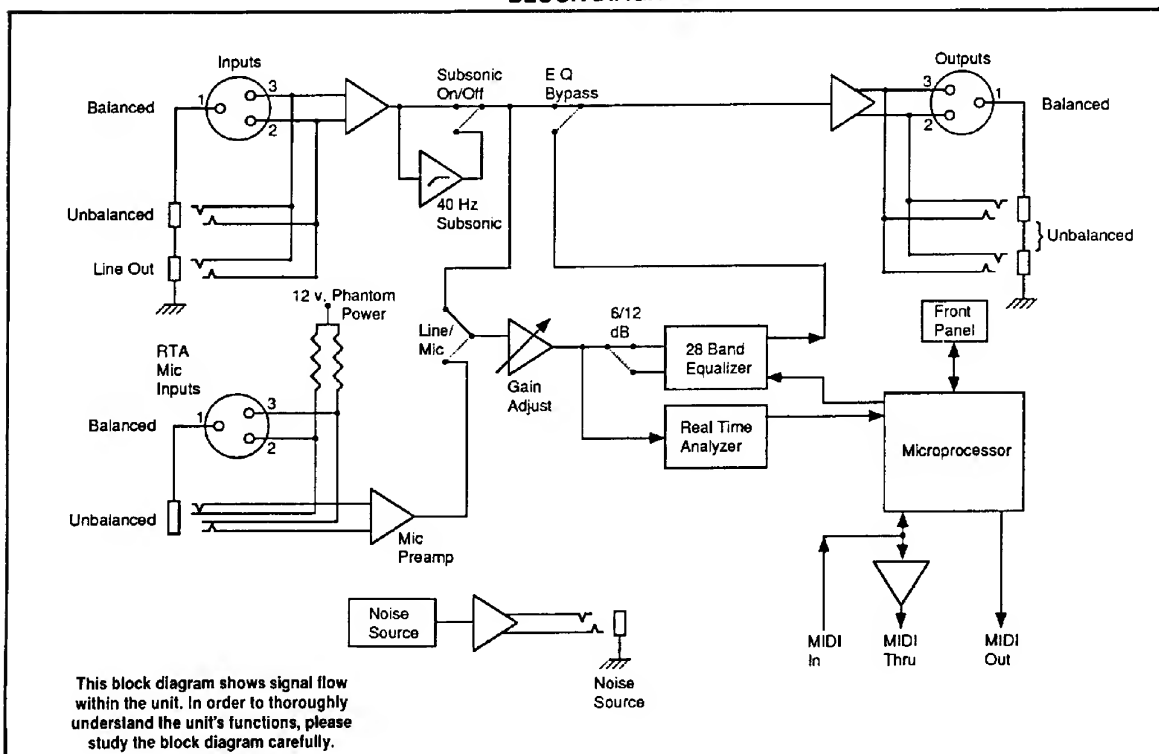
Front Panel
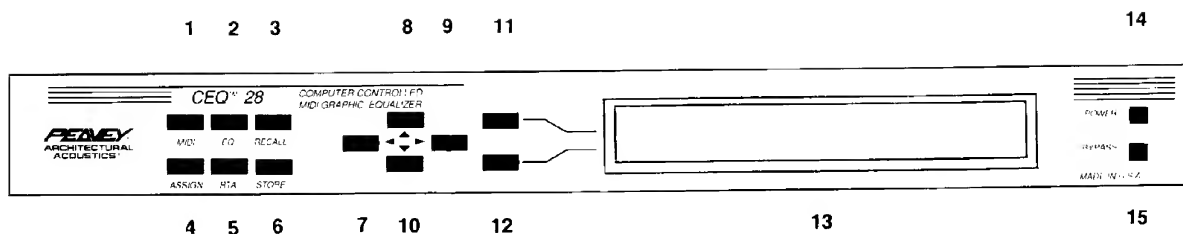
1. MIDI Function Selector Key
2. EQ Function Selector Key
3. RECALL Preset Selector Key
4. ASSIGN EQ Parameters Selector key
5. RTA Selector Key (Real Time Analysis with Mic input)
6. STORE Preset Selector Key
7. LEFT-HAND Cursor Key
8. 'UP' Cursor Key

9. RIGHT-HAND Cursor Key
10. 'DOWN' Cursor Key
11. 'UPPER' Softkey
12. 'LOWER' Softkey
13. 40 × 2 character, liquid crystal, back-lit, display window
14. Power On/Off switch
15. Equalizer Bypass switch

Rear Panel

16. 16-16.5V AC Power supply socket: CAUTION: use only the power supply unit supplied with this unit or damage may result
17. MIDI Out Port
18. MIDI Thru Port
19. MIDI In Port
20. Pink Noise output - ¼" phone jack, unbalanced using 2-circuit phone plug, or electronically balanced output using a (Tip - Ring - Sleeve) 3-circuit phone plug
21. Equalizer output - ¼" phone jack, unbalanced using 2-circuit phone plug, or electronically balanced output using a (Tip - Ring - Sleeve) 3-circuit phone plug
22. Equalizer output - ¼" phone jack, unbalanced using 2-circuit phone plug, or electronically balanced output using a (Tip - Ring - Sleeve) 3-circuit phone plug
23. Equalizer electronically balanced Line output (XLR)
    NOTE: 21, 22 and 23 are all wired in parallel

24. Input Line out - ¼" phone jack, unbalanced using 2-circuit phone plug, or electronically balanced output using a (Tip - Ring - Sleeve) 3-circuit phone plug. Can be used to loop EQ input signal to other inputs
25. Equalizer input - ¼" phone jack, unbalanced using 2-circuit phone plug, or electronically balanced input using a (Tip - Ring - Sleeve) 3-circuit phone plug
26. Equalizer electronically balanced Line input (XLR). Electronically balanced Line input.
    NOTE: 24, 25 and 26 are all wired in parallel
27. RTA microphone input - ¼" phone jack, unbalanced using 2-circuit phone plug, or electronically balanced output using a (Tip - Ring - Sleeve) 3-circuit phone plug
28. RTA microphone input - XLR input, electronically balanced. Has +12 volts DC phantom power supply

MODEL   **MIDI Implementation**

Function...		Transmitted	Recognized	Remarks
Basic Channel	Default Channel	1 1-16	1 1-16	
Mode	Default Messages Altered		1,3	memorized Omni on/off
Note Number	True Voice			
Velocity	Note ON Note OFF	X X	X X	
After Touch	Key's Ch's	X X	X X	
Pitch Bender		X	X	
Control Change		0-120 0 Volume 1 Band 1 (32Hz) " " 28 Band 28 (16kHz) 64 Subsonic Filter on/off 65 EQ Range 6/12dB	0-120 0 Volume 1 Band 1 (32Hz) " " 28 Band 28 (16kHz) 64 Subsonic Filter on/off 65 EQ Range 6/12dB	Programmable EQ Vol., Bands 1-28 Programmable as a block Subsonic, EQ Range Individually Programmable Controller value 0 to 63; off 64 to 127; on 0 to 63; 6dB 64 to 127; 12dB
Prog Change	True #	0-127	0-127	
System Exclusive		O	O	
System Common	: Song Pos : Song Sel : Tune	X X X	X X X	
System Real Time	: Clock : Commands	X X	X X	
Aux Messages	: Local ON/OFF : All Notes Off : Active Sense : Reset	X X X X	X X X X	
Notes				

Mode 1: OMNI ON, POLY   Mode 2: OMNI ON, MONO   O: Yes
Mode 3: OMNI OFF, POLY   Mode 4: OMNI OFF, MONO   X: No

SYSTEM EXCLUSIVE COMMANDS

The format below, used for all system exclusive commands, is as follows:

Hexadecimal:

FO -- Start of System Exclusive

OO -- Peavey's Manufacturer ID

OO --

1B

04 -- Peavey Product ID (CEQ™ 28)

ON -- MIDI channel #

OX -- Command byte

xx -- Data bytes

F7 -- End of Exclusive (EOX)

The header used for all commands consists of:
FO OO OO 1B O4 ON where 'ON' is channel

The command bytes and date formats are listed below:

LOAD A PRESET
When received, the preset data is loaded into receiving unit.

01 -- Load preset command byte

nn -- Preset # to be loaded (0 - 127)

DATA -- 78 BYTES (39 data bytes sent a nibble at a time)

F7 -- EOX

DUMP A PRESET
When received, the unit sends the requested preset data in a load preset format (see above).

02 -- Dump preset command byte

nn -- Preset # to be dumped (0 - 127)

F7 -- EOX

LOAD ALL PRESETS
When received, all 128 presets are loaded with the new data.

03 -- Load all presets command byte

DATA -- 9984 BYTES (128 presets × 39 bytes × 2 nibbles)

Presets are dumped in order (0 - 127)

CKSUM -- 2's compliment of the Modulo 128 sum of the DATA bytes (CKSUM = -1 × Modulo 128 sum of data)
The SUM of the received CKSUM and the Modulo 128 sum of the received data should equal zero

F7 -- EOX

DUMP ALL PRESETS
When received, the unit dumps all program presets in the load all presets format above.

04 -- Dump all presets command byte

F7 -- EOX

Each program preset consists of the following 39 bytes:

BYTE	DESCRIPTION	RANGE/FORMAT	
1	CC Value for EQ gain	0 - 127	
2	CC Value for band 1 (32 Hz)	0 - 127	
3	CC Value for band 2 (40 Hz)	0 - 127	
4	CC Value for band 3 (50 Hz)	0 - 127	
-	-	-	
-	-	-	
-	-	-	
28	CC Value for band 27 (12.5 kHz)	0 - 127	
29	CC Value for band 28 (16 kHz)	0 - 127	
30	MIDI Status byte	xxxxSxRA	
31	ADD program preset number	0 - 127	
32	8 character user lable field	ASCII	
33	8 character user lable field	ASCII	
-	-	-	
-	-	-	
-	8 character user lable field	-	
39		ASCII	

MIDI STATUS BYTE

S	Subsonic Filter ON/OFF	1 = ON	0 = OFF
R	EQ Range	1 = 12 dB	0 = 6 dB
A	ADD ON/OFF	1 = ON	0 = OFF
x	Don't care		

NOTE: The CEQ™ 28 displays the program presets (0 -127) as 1 to 128.

The system exclusive data is transmitted a nibble at a time. The high nibble (top 4 bits) is transmitted first followed by the low nibble.

SPECIFICATIONS

All specifications are typical unless otherwise noted.
0 dBV = 1 Volt

All specifications are referenced to nominal output level
(0 dBV) unless otherwise noted.

All measurements are wideband 20 Hz to 20 kHz unless otherwise stated.

NOTE: All specs measured at 1V RMS input and unbalanced output. All sliders at mid position, all switches out unless otherwise noted.

Frequency Response: (Balanced and Unbalanced Outputs)
+/- 1 dB 20 Hz - 20 kHz

Distortion:
Less than .01% (20 - 20K) .005% Typical

Common Mode Rejection Ratio (CMRR):
36 dB Typical

Input Impedance:
Unbalanced: 20K ohms
Balanced: 20K ohms (equal impedances to ground)

Output Impedance:
Unbalanced: 1K ohms
Balanced: 2K ohms

Maximum Input Level:
Unbalanced: +23 dBV (14V RMS)
Balanced: +23 dBV (14V RMS)

Maximum Output Level:
Unbalanced: +17 dBV (7V RMS)
Balanced: +23 dBV (14V RMS)

Nominal Input Level:
Unbalanced: 0 dBV (1V RMS)
Balanced: 0 dBV (1V RMS)

Nominal Output Level:
Unbalanced: 0 dBV (1V RMS)
Balanced: +6 dBV (2V RMS)

Input Headroom:
Nominal = 23 dB

Output Headroom:
Unbalanced: 17 dB
Balanced: 17 dB

Output Noise: Unbalanced Output
EQ Out: -95 dBV
EQ In, all Flat: -90 dBV

Filter Bandwidth:
1/3 Octave

Filter Frequencies:
31.6, 40, 50, 63, 80, 100, 125, 160, 200, 250, 316, 400, 500, 630, 800, 1K, 1.25K, 1.6K, 2K, 2.5K, 3.16K, 4K, 5K, 6.3K, 8K, 10K, 12.5K, 16K

Filter Q:
4.77
40 Hz to 12.5 kHz

Shelving Filters:
32 Hz and 16 kHz are 12 dB octave

Maximum Boost & Cut Filters:
+/- 12 dB (+/- 12 dB Position)
+/- 6 dB (+/- 6 dB Position)

Maximum Boost & Cut Gain: (WideBand Gain)
+/- 12 dB (+/- 12 dB Position)
+/- 12 dB (+/- 6 dB Position)

Subsonic Low Cut Filter:
18 dB per octave

Frequency:
40 Hz

LIMITED WARRANTY

Peavey Electronics Corporation warrants to the original purchaser of this new Architectural Acoustics® product that it is free from defects in material and workmanship. If within one (1) year from date of purchase a properly installed product proves to be defective and Peavey is notified, Peavey will repair or replace it at no charge. (Note: Batteries and patch cords not covered.) "Original purchaser" means the customer for whom the product is originally installed.

Damage resulting from improper installation, interconnection of a unit or system of another manufacturer, accident or unreasonable use, neglect or any other cause not arising from defects in material and workmanship is not covered by this warranty. The warranty is valid only as to products purchased and installed in the United States.

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